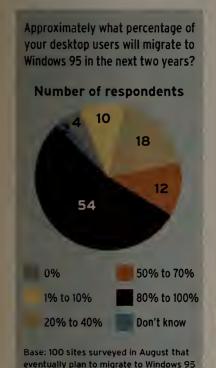
"Harmless" virus hoaxes do exact a price: They eat up time and resources. Page 71

Remote access vendors aiming products at small companies accidentally benefit big ones. Page 63

The Newsweekly for Information Technology Leaders News updates, features, forums: www.computerworld.com December 9, 1996 · Vol. 30 · No. 50 · 178 pages · \$3/Copy \$48/year



## **Microsoft** pushes OEMs for 'net gain

By Laura DiDio and April Jacobs

MICROSOFT 1S trying to launch a pre-emptive strike in the Internet arena by making sure its Windows operating systems are the first things users see when they boot up.

That move has caused some industry observers to foresee antitrust violations; rivals and some PC makers to cry foul; and users, well, mostly to yawn.

Citing a condition of current licensing terms, Microsoft Corp. is demanding that PC makers Microsoft, page 127

## Oracle under the gun

▶ Informix turning screws with Universal Server

By Craig Stedman

New York

HAVING SHIFTED ITS focus to network computers, Oracle Corp. has suddenly found itself forced to defend its database stronghold from the barbarians at Informix Software, Inc.

Informix last week announced its Universal Server

object/relational database at DB/Expo '96 and will ship the product by year's end. That is six months or more before Oracle will finally be ready with the long-promised Oracle8, which also will be object-enabled.

Users who crave object and multimedia data support are taking note. CS First Boston Oracle, page 127

But it continues to draw fire from naysayers. Page 53

## Traditional mail clients losing hold as users turn to browsers

By Barb Cole

THE DAYS OF BUYING into a client/server messaging architecture may be over, as proprietary mail clients — under pressure from mail-enabled Web browsers — appear to be dying.

The shift toward browserbased mail won't happen overnight. This has been a banner year for mail clients, and companies that have begun largescale rollouts of these products are expected to continue their deployments.

But the tide is definitely starting to turn. More companies are opting to roll out World Wide Web browsers as their principal mail client or at least are planning to offer browsers as an alternative for users who don't require full-blown mail clients, according to analysts and users.

Mail clients, page 14

"I'm dreading the day when we will actually have to move to a Unix box. I think I will cry."

-Lee Perry, systems manager, Avery **Dennison** 



Legacy minicomputer users loyal to the end

By Jaikumar Vijayan

LEE PERRY STILL remembers when he upgraded his HP 3000 system 21/2 years ago.

"It was a used machine that we had to ship all the way from California," said Perry, a systems manager at Avery Dennison Corp. in Bowmanville, Ontario. "When it finally got here, the case was all smashed up, the system had tipped over, and a whole side had caved in."

"But then we plugged it in,

switched it on, and it has been working just fine ever since," he

It is that brand of ruggedness that has prompted Perry to stick with Hewlett-Packard Co.'s aging minicomputer platform for 12 years now. "And in all that time, the system has not gone down even once," he said.

So it isn't surprising that most users in a Computerworld survey say they plan to keep their proprietary systems as

Stayin' alive, page 16

## Time's running out.

With the clock ticking down, this week's Computerworld offers three

features on the year 2000 conversion problem. Turn to In Depth, page 96, for a sound-off: Is it time to panic, or isn't it? In Managing, page 83, find out what you should do now if you're behind on your conversion. In IT Careers, page 98, find out which IS professionals stand to gain from these projects.



## UPFRONT

## Hype patrol

thought you'd be interested in some of the tectonic shifts in the industry that are occurring right under your feet. I didn't know about them myself until some vendors told me the following last week:

■ Data warehouses are out; data marts are in. It turns out warehouses are too expensive to develop. IS managers who have dropped a couple of million dollars on warehouse projects are no doubt enormously relieved.

■ Intranets are out; "extranets" — hybrid internal/external nets — are in. So intranets lasted, like, a whole year, right?

■ Client/server is out; thin clients are in. Sorry you spent so much money when client/server was popular a couple of years back.

Java is mature. Stop wasting money on C and Cobol.

OK, remove tongue from cheek. None of these statements is true. All were used in product presentations I heard at DB/ Expo '96 last week. The computer industry's hype cycle contin-

ues to spiral out of control, and I sense a lot of IT people are getting sick of it.

## Intranets lasted, I wish I could say the hype will abate soon, but I doubt it. The Internet and the advent of really big servers have created

application categories that didn't exist just a year ago. And with that come the marketeers and their miracle cures.

The burden falls heavily on IS at these times to take a pin to the hype balloon. Be wary of airline magazine syndrome, in which users gush about something they read about in-flight.

Stay well-informed. Call your colleagues for advice. And keep your BS detector in tune. There are often good ideas behind the hype, but they emerge only after the high initial expectations have faded.

Paul Gillin, Editor
Internet: paul\_gillin@cw.com

## **TOKEN RING**

## Cabletron plans faster modules

By Bob Wallace

CABLETRON SYSTEMS, INC. this week will detail plans for Token Ring switching modules that will enable IBM shops to supercharge their Token Ring networks, Computerworld has learned

The vendor is lining up faster and 20% less-expensive modules for its data center ATX LAN switch as well as Token Ring switching modules for its flagship MMAC-Plus hub, sources close to the company said.

Most IBM shops use Token Ring LANs to support missioncritical accounting and finance applications and are candidates for these enterprise Token Ring switches and switching hubs. Ethernet LANs are more widely deployed but are typically used for less critical applications.

The latest market figures show Cabletron finishing second to IBM, with 16.6% of the 54,400 ports shipped in the third quarter of this year, according to Dell'Oro Group in Portola Valley, Calif. And the market is booming (see chart).

"Anything with a lower cost that gives me more bandwidth would be something I'd commit to using in my Token Ring network very soon," said Bob Cur-

SWITCH REVENUE		
1995	\$55M	
1996	\$307M*	
1997	\$633M*	
1998	\$1.08B*	
*Projected		

Source: Dell'Oro Group, Portola Valley, Calif.

rier, director of data communications at Duke University in Durham, N.C., a longtime Cabletron customer who already uses the vendor's ATX switches.

The modules will allow users to deploy fatter pipes where they need them most: between scores of employees and heavily used resources such as high-speed servers and mainframes. They will also be used in backbone networks.

"These products will enable users to protect and extend their large investments in Token Ring technology by providing dedicated bandwidth where it's needed," said John Morency, a principal at The Registry, Inc., a consulting and research firm in Newton, Mass. It is imperative for Cabletron to maintain its Token Ring switching focus, he added, as it takes on IBM.

A Cabletron spokesman con-

firmed plans to announce the Token Ring switching products but wouldn't provide details.

In addition to being 20% less expensive than existing ATX plug-ins, the Cabletron Token Ring Switch Modules will support a nascent technology that can double the speed on each Token Ring switch port, sources said.

That technology is Dedicated Token Ring — also known as Full-Duplex Token Ring — that enables each 16M bit/sec. switched port to operate at 32M bit/sec. That gives users fatter pipes through which to deliver simultaneous access for hundreds of users via heavily used servers and mainframes.

"A 32M-bit pipe to servers would be something I'd jump on to help me help users get faster response times from servers," Currier said.

Token Ring modules due for Cabletron's MMAC-Plus will extend the Rochester, N.H., hub maker's beachhead in the Token Ring market because there are far more users of that high-end hub than ATX customers.

The new Token Ring Switch Modules will ship in 90 days, sources said. Availability and pricing for the MMAC-Plus modules weren't available.

## THE FIFTH WAVE

BY RICH TENNANT



"Our classroom PCs have created a challenging atmosphere where critical analyzing, synthesizing, and problem-solving skills are honed. I think the students have gotten a lot out of them too."

## Oracle puts users in Web publisher's seat

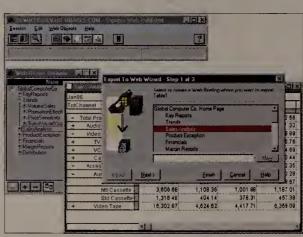
By Sharon Gaudin

oracle corp. will release its Express Web Publisher at Internet World '96 this week in New York and at the same time loosen the hold webmasters have on users.

The software was designed to let end users without any Web authoring capabilities take the information they have produced through online analytical processing

analytical processing (OLAP) and dynamically create a World Wide Web page for it.

"End users have been beholden to webmasters," said David Menninger, senior director of marketing for Express Technology at Oracle. "If the webmaster hasn't published information on the Web, no one has access to it. We want to empower end users to not only find that information but to publish it."



Oracle's Express World Publisher may reduce users' reliance on webmasters

That would constitute a departure for many companies that require all data posted on

intranet or Internet sites to pass through the webmaster for security, legal and confidentiality reasons.

The Web pages, which will be interactive, typically will be posted on intranets, although they could go out on the Internet.

Express Web Publisher is free and will be released in February as part of Express Objects, a development environment for

OLAP applications, and Express Analyzer, an enterprise solution for financial analysis.

## Come visit our Web site @Computerworld

•THE ROAD TO 1/1/00. Stymied by your year 2000 project? Our decision tree helps you plot your next step. Plus, online links and a year 2000 scoreboard. (www.computerworld.com)

•THE INTERGRAPH PUSH. Intergraph Corp. makes a strong foray into the quad-Pentium server market with the InterServe 66o. Details in Buyer's Guide. (www.computerworld.com/guide)

## JavaSoft heats up Beans tool kit beta

By Sharon Gaudin

JAVABEANS WILL MOVE from theory to reality this week as JavaSoft prepares to release the beta version of its Bean Developer Kit (BDK) at Internet World '96.

The tool kit offers programmers a development environment, documentation, tutorials and a testing environment for Bean development. JavaBeans is the architecture that links Java applets to applications so they can communicate and invoke one another. Java applets until now have acted as separate applications with no link.

JavaSoft is a division of Sun Microsystems, Inc.

## **LEARNING SHORTCUT**

"I can see the tutorial and testing as potentially very useful, especially for those of us who are learning about Beans and what they're about," said Larry Hagerty, a senior systems engineer at GTE Data Services in Tampa, Fla.

Gina M. Centoni, product line manager for Java Beans at Java-

Soft, said BDK 1.0 beta will include an object code build, which enables the installation and building of a Bean; documentation on how to build a Bean; and a Bean Box, which gives developers a tutorial about what a Bean can do and an environment where developers can test new Beans.

The official release of BDK 1.0 is slated for the first quarter next year.

Centoni said several tool vendors will support Bean. IBM is adding Bean support to its upcoming Visual Age for Java. Scott Hebner, a product manager at IBM, said Beans support will be added to the Visual Age family throughout next year.

IBM also will demonstrate at Internet World its Applet Author, a tool announced late last week that will let developers build World Wide Web applications and pages with JavaBeans.

Borland International, Inc. is adding support to its Latte.

Microsoft's proposed Java strategy draws fire, user concern. Page 53

## Say it ain't so, Joe

► Longtime sales executive now a consumer advocate

By Julia King Joe Orlando likes to say he's buying his way back to heaven. Today, he does it dressed in a double-breasted Armani suit, silk tie and matching pocket handkerchief. A gold Rolex flashes be-

neath his crisp, white monogrammed cuff when he waves his arm to make a point. His perfectly coiffed dark brown hair never seems to move as he swaggers back and forth at the front of the room.

He's telling his audience of information systems buyers the one about the software vendor that hired a headhunter to set up interviews for nonexistent jobs with members of a firm's procurement team.

## **PUMPING FOR INFO**

Over successive \$200 dinners at the best restaurants in town, the recruiter would extract from each of his marks the company's negotiating strategy and exact purchase plans — all under the guise of conducting an employee search for an unnamed client.

Say it ain't so Joe, page 78



## IBM serves up real-time video over Internet

By Tim Ouellette

RS/6000 server for delivering real-time video over the Internet and later this month will test a tool set that simplifies searches of diverse multimedia files.

VideoCharger for AIX 4.2 can stream audio and video over the Internet to World Wide Web browsers without requiring that users download and then play the file.

The server can detect what speed is best to deliver the real-time video without affecting bandwidth or bogging down the client, IBM officials said.

To go along with multimedia content delivery, IBM later this month will start beta-testing a suite of tools called MediaMiner.

MediaMiner tools will let Web developers add full-text and image search capabilities to multimedia data stored on the RS/6000. Future MediaMiner

tools will search for video and audio data and will support the S/390 mainframe platform.

The moves follow a recent announcement of high-availability Web servers based on the RS/6000 and the delivery of Multimedia Server for AIX software earlier this year.

For example, Indiana University uses Multimedia Server to manage the launch of more than 1,000 sound files per day.

## Future MediaMiner tools will search for video and audio data.

While Multimedia Server can serve up video, the performance isn't the same as VideoCharger, which can move the video over Internet protocols.

"VideoCharger is a natural extension of the Multimedia Server, which was designed more for client/server networks and not for high-performance video serving," said Shulaimit Gershenson, an analyst at International Data Corp. in Framingham, Mass.

"We usually focus on desktop multimedia, so we are interested in looking at the Web-based video delivery" that VideoCharger offers, said Mike Halm, manager of multimedia at Pennsylvania State University in State College, Pa.

The ability to stream video in real time at low bit rates lets users access video from remote PCs via a 28.8K bit/sec. modem, for example.

But in a blow to IBM's OS/2 efforts, VideoCharger delivers video only to Windows 95 clients. It also requires that users run the VideoCharger Player, a Web browser helper application.

IBM also announced Media-Streamer, an RS/6000 bundled with software to stream audio and video in digital and analog formats. Media-Streamer bundles target broadcasters and cable television companies. Pricing starts at \$128,770.

VideoCharger costs \$28,600 and will be available by March.

## Storage options: Zip or Zap

By Matt Hamblen

YOU'VE HEARD OF the Iomega Corp. Zip drive for desktop storage. Well, here comes Zap for CD from Cheyenne Software, Inc.

The 32-bit driver lets users store up to 650M bytes of data on a recordable CD, using any desktop computer that runs Windows 3.1x or Windows 95.

Cheyenne, a division of Computer Associates International, Inc. in Islandia, N.Y., today plans to announce Zap for CD. The product will be available next month for \$69.

Zap for CD costs less than the 10 other software drivers for recordable CDs and is easier to use, said analyst Michael Peterson, president of Strategic Research in Santa Barbara, Calif.

Zap for CD allows for the drag-and-drop features of Windows and doesn't require premastering to store the files on the CD, Peterson said.

Rick Onyon, director of desktop products at Cheyenne, said the company chose the Zap name because it wants to convey that the product will be as easy to use as the popular Zip drive.

## SHORT SHELF LIFE?

One lingering question is whether the recordable CD market will survive Digital Video Disc (DVD), a technology that allows much more storage than a recordable CD.

"We think DVD is a long way off," Onyon said.

Peterson said the future of recordable CD looks promising. Analysts note that the federal government requires banks to archive records for as long as seven years.

One reason CDs are good for storage is their low cost — \$8 for a 650M-byte CD, compared with \$20 for a 100M-byte Zip disk, Peterson said. A recordable CD drive costs about \$500 and could drop to \$300 by mid-1997, compared with \$200 for a Zip drive today.

But the real value of a recordable CD may be that once it is recorded upon, it can be played on a CD-ROM drive.

## In this issue

## NEWS

## 3 Linking applets

Sun set to ship beta of JavaBeans kit to link Java applets to larger applications.

## 14 HP spins Web

HP packages range of Internet technologies into integrated business package.

## 24 Look ma, no wires

After a year of retooling, RadioLAN is shipping a revamped wireless, intrabuilding Ethernet hub.

## 28 Internet business

Vendors cooperate to create 'net business standards for vertical industries.

## OPINION

## 37 PC for NCs

Consider politics, as well as technology, when considering network computers, Michael Schrage advises.

## 58 Frankly speaking

Despite all the coffee in Seattle, Microsoft still doesn't get Java, Frank Hayes contends.

## TECHNICAL SECTIONS

## SERVERS & PCs

## 49 Mulling migration?

Replacing your midranges? Take caution — and the advice of those who have done it themselves.

## 49 NC conundrum

Analysts predict limit on usefulness of network computers in the enterprise.

## 49 Short life

Notebook users complain that hot new features suck up battery life.

## SOFTWARE

## 53 License look

Software licensing is more complex than ever. Mix technology and policy to save money and headaches.

## 54 Masking mainframes

Eicon ships product to hide mainframe complexity from users.

## 56 Visual Age for Basic

Product review: IBM targets Microsoft's

Visual Basic with new development tool.

## THE ENTERPRISE NETWORK

## 63 Where's Warp?

OS/2 vendors are steamed at the difficulty of getting preconfigured systems.

## THE INTERNET

## 71 Crypto questions

Clinton administration's pending cryptography policy has vendors, privacy advocates up in arms.

## 71 Who goes where?

IS needs to limit users' Web access but must tread carefully or risk revolt.

## CORPORATE STRATEGIES

## 77 Skills preview

U.S. Cellular hired a consultant to evaluate its client/server skills before it started a migration.

## FEATURES

## MANAGING

## 85 Year 2000 scoreboard

## 89 Software can't get worse

Software has many troubles, but there's room — and time — for improvement, Paul Strassmann says.

## IN DEPTH

## 96 Sound of

Is it time to panic over the year 2000?

## BUYER'S GUIDE

## 93 My opinion

Columnist Ross Greenberg reviews the FutureSplash Animator product.

## MARKETPLACE

## 117 All-in-one

Printers, copiers and more: Multifunction machines get serious.

## ETC.

Company Index125
Editorial/Letters36, 44
How to Contact CW/Subscriptions 125
Inside Lines 130
Stock Ticker123

## UP THE REVOLUTION LICENSE MONITORING Blue Cross/Blue Shield "The [SPA] has put of New Jersey's Joe [the] fear of God in Donald led client/ **PRODUCT** people," says Diane ver charge and kept REVIEW DelVecchio of Is out of it. Strong perfor-Smith Technology. News, page 12 mance, low price Software, give midrange page 53 Intergraph server an edge. Buyer's Guide, page 91

## PUTTING ISDN TO THE TEST

Download times of a 2M-byte image file

Technology used	Time	
56K bit/sec. ISDN line	35.7 seconds	
1.5M bit/sec. DSL line	1.3 seconds	
4M bit/sec. cable connection	.05 seconds	

## ISDN nears point of now or never

By Kim Girard

SANTA CLARA, CALIF.

USERS AT ISDN WORLD last week questioned why the industry hasn't moved more quickly to solve ordering, installation, availability and pricing problems that have plagued the technology for years.

But they expect the pressure to fix those problems to intensify in the next year as competitors plot to attract Integrated Services Digital Network

Services Digital Network (ISDN) customers with promises of higher speeds and lower proces.

To fend off competition from a new breed of highspeed alternatives, ISDN carriers and vendors must

work together to offer easier ordering and installment and more consistent national pricing, said Jeffrey Fritz, a telecommunications engineer at West Virginia University in Morgantown.

"Every year is a critical year for ISDN," Fritz said. "It's an evolving technology that's proving itself." But, he added, "the question is, is it improving fast enough?"

## RINGING IN ANEW

The complaints at this year's conference had a familiar ring — they are the same problems discussed by the group last year and the year before.

As a result, national ISDN line installations are lagging behind expectations. For example, Pacific Bell expects to install 200,000 ISDN Basic Rate Interface lines by the end of next year, far fewer than the 1 million lines targeted by 1998.

In the meantime, industry buzz has moved to new lines of super high-speed technology, including cable, 56K bit/sec. modems and Asymmetric Digital Subscriber Line (ADSL) technology. ADSL promises — though not on a wide scale for

several years — to deliver Internet access to remote users at speeds of up to 6M bit/sec.

But the rival offerings are expected to have their own problems. ADSL, a technology that delivers high-speed Internet access over regular copper lines, won't be widely available for several years and will require expensive reconditioning of telephone lines in some cases.

Experts said that in some areas, 56K bit/sec. modems

"Every year is a critical year for ISDN."

- Jeffrey Fritz,
West Virginia University

can't deliver the speeds promised because noise filters installed on phone lines limit bandwidth.

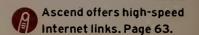
Many users said they can't take advantage of 33.6K bit/sec. modem speeds for that reason. Providers also must work out a standard to make 56K bit/sec. modems interoperable.

Not surprisingly, many telecommunications managers are confused by — or completely unaware of — these fledgling technologies.

Teresa Mills and Scott Gardner, two telecommunications systems engineers at Lockheed Martin Corp. in Bethesda, Md., are trying to learn as much as possible while preparing for companywide home office ISDN installations next year.

Gardner said the challenge of ISDN is predicting cost (rates vary from \$17 per month from Northern Alabama Telephone Co. to \$100 per month from US West, Inc.) and what users will face ordering and installing it.

"We're concerned that once they actually set it up, it won't be as fast as expected," Mills said.



## Total Enterprise Management



Now, there's an open and independent solution to all of your enterprise management challenges.

Finally, there's a single answer to all of your enterprise management challenges.

New CA-Unicenter TNG.

The first open and independent software solution that covers all of your existing systems, networks, databases and applications. All your hardware. All your software. All your IT resources.

CA-Unicenter TNG makes it easy. With a stunning, real world interface that uses 3-D graphics to let you actually "fly" through your enterprise without leaving your desk. And innovative Business Process Views that let you view IT resources from a business perspective. It's the best way to transform IT information into intelligence.

Call 1-800-654-6118 For A Free TNG Video And To Register For A Seminar: Or Visit Us At http://www.cai.com

Call today to learn more about the single, integrated solution for End-to-End Management. It's the technology of tomorrow — that's available today.

Software superior by design.

## Mew Calumicenter Inc.

©1996 Computer Associates International, Inc., Islandia, NY 11788-7000. All other product names referenced to the increase of their respective companies

## Taking control

► Load-balancing software gives network managers ability to regulate traffic

By Bob Wallace and Patrick Dryden

PROVIDING USERS with sorely needed control and management of internal and external network traffic is the aim of a trio of products debuting this week.

The fast pace of intranet construction and the skyrocketing use of the Internet are creating network traffic problems that force users to continually add World Wide Web servers — a costly and inefficient practice.

The packages from startup Resonate, Inc., HydraWeb Technologies, Inc. and IBM offer a less expensive, more manageable approach to boosting Web site performance by spreading hits among multiple local or geographically dispersed Web servers.

Resonate, in Mountain View, Calif., is rolling out \$7,995 Web server software. HydraWeb, in New York, is introducing an overhauled version of its namesake load-balancing software. IBM is weighing in with Network Dispatcher, another loadbalancing software package.

Users and analysts lauded Resonate's Dispatch Web server software as the most advanced and flexible package of the lot.

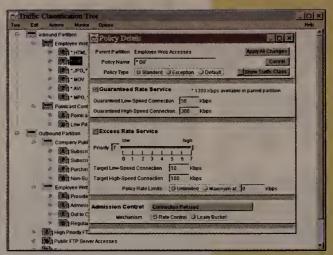
'I'm excited about the idea of having servers handle specific types of calls rather than replicating the contents on each box," said Sheryl Olguin, a group leader at Harris Corp. in Melbourne, Fla.

"Dispatch goes beyond Web load balancing, which other packages handle, to attack performance issues," said Clay Ryder, an analyst at Zona Research, Inc., a consulting firm in Redwood City, Calif. "Calls can be routed to servers that perform separate functions, which eliminates the inefficient practice of replicating server contents in each box.

## FEATURE-PACKED

Resonate's Dispatch offers IS managers redundancy, Javabased system management and reduced reliance on proprietary hardware, Ryder added. The software can run on Sun Microsystems, Inc. SPARCstation servers. HydraWeb and Cisco Systems, Inc. offerings require special proprietary hardware. The Java package lets IS managers monitor the performance of their Web sites.

"Without redundancy, the server becomes a single point of failure for your Web site," said Steve Plastrik, vice president of technical operations at Viacom Interactive Services, Inc. in New York. "If that server goes down, you're out of business.'



With Packateer's PacketShaper, managers can set bandwidth priority policies to guarantee minimum service levels

Peter Madams, vice president of software at PictureTalk, Inc. in Pleasanton, Calif., agreed. "We need our servers up all the time and operating at peak performance, and Dispatch is the only way to create reliable and redundant Web sites." he said. PictureTalk, which makes conferencing software products, has Web servers in New York, Phoenix, Los Angeles and San Francisco.

The HydraWeb load-balancing package works like a router, directing traffic to the server best able to handle each request within a farm of Web servers.

Instead of installing on a server, HydraWeb comes in a selfcontained hardware unit that eliminates software setup and enables remote management and troubleshooting. It offers hot-spare capability, so another

**Device prioritizes 'net traffic** 

A clever start-up this week will introduce a kind of valve for Internet access points that will let network managers control the

flow of traffic in and out of their domains for

Packeteer, Inc. in Campbell, Calif., will unveil PacketShaper, a hardware/software combination that allocates network bandwidth to avoid the burst-and-delay performance that frustrates Internet users. Analysts praised the approach for its unique control and simplicity.

PacketShaper enforces policies that define which users or applications can use how much of the precious available bandwidth. The definitions are based on the priority of

For example, managers or webmasters can balance free-for-all TCP/IP access to a server from local network, intranet and dial-up connections to prevent a few high-speed users from dominating a Web site. They can guar-

antee a minimum level of service for a vital activity, such as reporting sales or making purchases.

In the struggle to improve Internet performance, PacketShaper complements load balancers but doesn't require new protocols or changes to routers, clients or servers. Each unit costs \$7,250 and is inserted between a router and hub or server.

"Other approaches rely on a handshaking scheme to negotiate quality of service, but this plops down in an existing network," said Bobbi Murphy, principal analyst at Dataquest in San Jose, Calif. "It's a slick way to control flow without overhauling everything." - Patrick Dryden

unit can take over in case of failure. Pricing starts at \$8,000 and includes agents to support Windows NT and a variety of Unix servers.

IBM's Network Dispatcher is similar to Resonate's Dispatch but lacks the intelligent scheduling capabilities, analysts said. The offering costs less than rival products.

Like Dispatch and HydraWeb,

Network Dispatcher distributes hits across multiple local or geographically dispersed Web sites and simplifies administration by letting all Web servers use one uniform resource locator and one IP address.

Network Dispatcher software costs \$1,500 and will ship in the first quarter of 1997 for Sun Solaris and Windows NT platforms.

## 0

## Court to hear Decency Act case

In a decision that will set national precedent for Internet usage, the U.S. Supreme Court on Friday agreed to hear a lawsuit filed by the American Civil Liberties Union that seeks to throw out the Communications Decency Act. The law was designed to protect minors from being exposed to obscene or indecent material online. Opponents say the law is so broad that it could criminalize speech that is legal in other media. A decision is expected in the first half of 1997.

## Compag recalls adapters

Compaq Computer Corp. is recalling defective AC adapters supplied with its Armada 4100 notebooks because they could pose an electrical shock hazard. Compaq's voluntary action results from an agreement with the U.S. Consumer Product Safety Commission. The recall affects three-pronged AC adapters sold from Sept. 23 to Nov. 20 that have the number 217984-001 on the bar-code label. Owners of these notebooks should call (800) 322-9515 for free replacement adapters.

## IBM builds framework

IBM is moving ahead on its planned object framework, code-named San Francisco, adding 25 independent software vendors to its team and releasing the first code for limited testing. IBM executives said last week they released code for the framework to 10 software developers in late November. A spokesman said the firm expects to release beta versions of code and object classes in the first half of next year and to announce specific products by the middle of the year. The project is an object-oriented application framework built with Java. IBM also announced that its group of independent software vendors has grown from 50 to more than 70. Those additions include Borland International, Inc., Platinum Technologies, Inc. and Symantec Corp.

## More layoffs at AMD

Microprocessor maker Advanced Micro Devices, Inc. last week said it will lay off 250 employees to cut costs. Most of the cuts affect workers at AMD's Austin, Texas, and Sunnyvale, Calif., facilities. AMD, which laid off 200 workers in September, said it would take an \$8 million charge to pay for this month's layoffs.

## PC makers back 56K modems

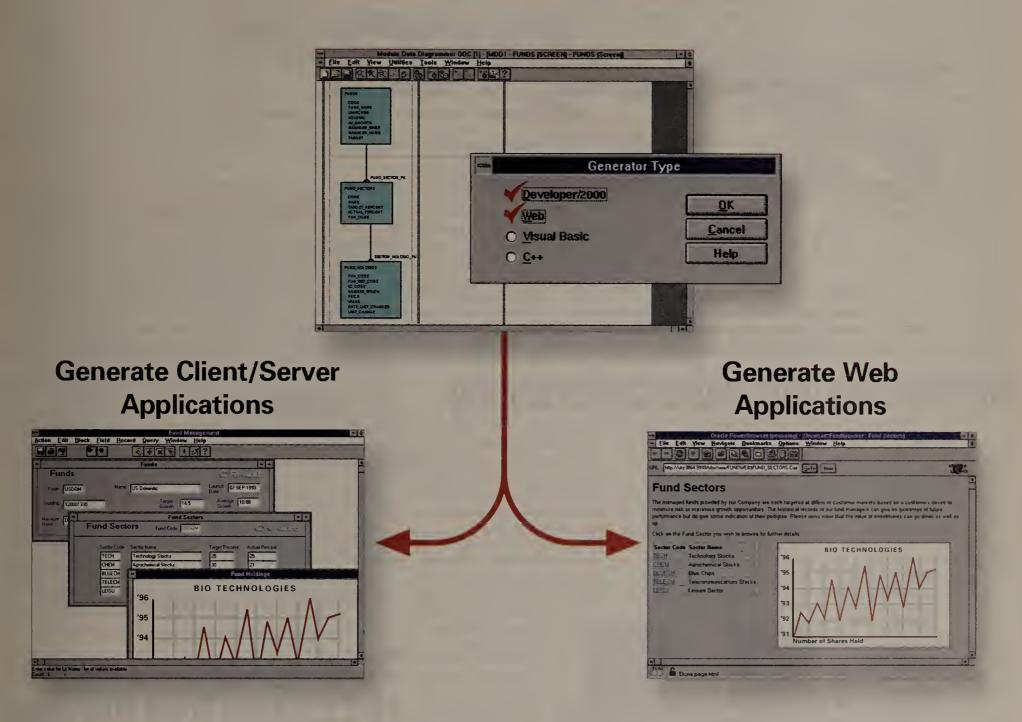
Four leading PC manufacturers last week said they would support a technical standard for 56K bit/sec. modems being pushed by Lucent Technologies, Inc. and Rockwell Semiconductor Systems. AST Computer, Inc., Compaq, Hewlett-Packard Co. and Toshiba Corp. said they will support K56Flex, a protocol that will interoperate between Rockwell's V.flex2 and Lucent's K56Plus modem technologies.

## Oracle to soak up Java

At this week's Internet World '96 in New York, Oracle Corp. will announce plans to support Java across its Network Computing Architecture and within its databases. The Redwood Shores, Calif., company is also beta-testing its Project Apollo electronic commerce server and WebServer 3.0, upcoming World Wide Web server software with transaction processing support.

## Generate Web and Client/Server Applications

## Oracle Designer/2000



Designer/2000™ enables you to define your application visually rather than writing thousands of lines of procedural code. Then, at the touch of a button, you can generate either a Web or a client/server application — or both. So you don't have to choose between supporting your existing client/server users or moving ahead to the Web. No other toolset can do this.

For more information, call Oracle 1-800-633-1071, ext. 10116, or find us on the Web at http://www.oracle.com



## Open Market upgrade will support big business on 'net

INTERNET COMMERCE vendor Open Market, Inc. this week will announce a more robust version of its mainline server product that is better suited to handle

big-business sales and service over the 'net.

OM-Transact 2.3 will include stronger ties to corporate back-office systems, new payment-processing capabilities and registration features to help webmasters customize their World Wide Web sites for individual visitors.

The company said it plans to ship its OM-Transact 2.3 software

by mid-February. OM-Transact records and verifies transactions - such as sales, requests for information and user log-ins to private Web sites. It was designed to work with big Web sites that serve tens of thou-

The software also was designed to serve as an adjunct to any standard Web server, including those from Microsoft Corp., Communications Netscape Corp. and the freeware Apache

server.

Open Market in Cambridge, Mass., has "a really good foundation for how to do transactions on the Web," said Shadrach Todd, manager of systems development at Time, Inc. New Media in New York, which produces the Pathfinder Web (pathfinder.com).

Experts said Open Market's technology



Open Market's software lets companies create customized views for their Web site visitors

## Tools tumble from Internet World

is likely to become more impor-

tant next year. As businesses

look to use the 'net for interac-

tive commerce, they will need a

way to track transactions of all

types. Open Market's software is

scalable, so one OM-Transact

server can handle transactions

for multiple Web servers across

The Internet vendor has

racked up a few high-profile cor-

porate users, including \$9 bil-

lion Banc One Corp., \$5.2 bil-

lion AMP, Inc. and \$8 billion

Time Warner, Inc.'s New Media

Open Market doesn't have

any no real competition yet in

its transaction-oriented view of

Web commerce, industry ob-

servers said. But Microsoft is de-

the country.

This week's Internet World '96 in New York will introduce tools for users on both sides of the computer screen.

veloping its own transaction

server. Other potential rivals are

developing servers to handle

to hosting catalogs on the Web

are shipping, or on the way, from Microsoft, Oracle Corp.,

Netscape and others. In another

kind of transaction, several soft-

ware vendors, including Vignette Corp. in Austin, Texas,

have developed servers for

building and publishing maga-

zines and other periodicals on

Transact will be announced at

Internet World this week in New

York. It will cost \$250,000 for corporate users and will run on

major Unix platforms.

The new version of OM-

For instance, servers devoted

specific transactions.

End users will see a boatload of tools designed to help them enhance privacy and sort good information from the clutter and noise of the Internet and the Web.

And behind the scenes, Internet developers will get some first looks at tools that exploit emerging technologies such as Sun Microsystems, Inc.'s Java.

Novell, Inc. this week will unveil alpha versions of new Java tools for IntranetWare, enhanced remote access capabilities for IntranetWare and enhancements to the Novell Web Server that boost speed, security and Internet access. IntranetWare, which shipped in September, combines a Web server with Novell's NetWare.

Pretty Good Privacy, Inc. in Redwood Shores, Calif., will introduce a product tentatively named PGPweb. It was designed to block Web "cookies," a technology that helps webmasters keep track of visitors to their sites.

And the Hitachi Software Products Group will introduce a server-based version of its ZooWorks Web indexer, a research tool that will index the entire contents of every page visited by every member of a workgroup. A single-user, desktop-based version came out earlier this year. — Mitch Wagner and Laura DiDio

## NetMeeting gets videoconferencing

By Justin Hibbard

MICROSOFT CORP. this week will unveil the second beta version of its Internet collaboration software, NetMeeting 2.0, that will add videoconferencing to existing voice conferencing and application-sharing features.

The addition of videoconfer-

encing based on the widely supported H.323 standard will help users build a platform for interoperable Internet telephony products, according to Microsoft. But jittery picture quality and gluttonous bandwidth requirements are likely to limit its use in corporations, users and analysts said.

## AT WHAT SPEED?

NetMeeting's videoconferencing provides

point-to-point communication at speeds of up to 10 frame/sec. across a 10M bit/sec. Ethernet LAN when used with 166-MHz Pentium processor-based PCs outfitted with video capture cards. When used with parallel port capture devices such as Connectix Corp.'s QuickCam, speeds slow to about 4 to 6

frame/sec., according to Micro-

"If you're actually trying to do videoconference, 4 or 5 [frame/sec.] is really slow," said Rob Enderle, an analyst at Giga Information Group in Santa Clara, Calif. That's one reason few employees use desktop videoconferencing for internal one-

Microsoft's NetMeeting videoconferencing performance will depend on the hardware used

to-one communications, Enderle said.

Another reason is that users accustomed to television have high expectations of desktop videoconferencing, said Jeff Marshall, senior managing director of communications technologies at Bear, Stearns & Co. in New York.

"We're finding that the user community is expecting betterthan-TV quality," Marshall said. "It's going to be very difficult for some of these videoconferencing systems to live up to."

Marshall, who hasn't tested the new version of NetMeeting, is a chief architect of Bear, Stearns' intranet, which runs

> multipoint videoconferencing over a 2.5G bit/sec. network.

Multipoint munication that supports up to eight conferees is essential for videoconferencing to be accepted, he

But NetMeeting's point-to-point videoconferencing will suffice at the University of Michigan, where pathologists plan to use the new feature to communicate with

colleagues at the University of Pittsburgh, according to Mike Lougee, a University of Michigan researcher.

The Ann Arbor, Mich., school has been using NetMeeting's application sharing to view live, microscopic video generated by an application at the University of Pittsburgh.

## Scripting improves access to Exchange from Web apps

By Barb Cole

MICROSOFT CORP. plans to rename the upcoming version of its messaging server Exchange 5.0 and make it easier to leverage Exchange features in World Wide Web applications, sources close to the company said.

At Internet World '96 this week, Microsoft will disclose plans to support its Active Server scripting language in Exchange. That capability, dubbed Active Messaging, will let Web developers incorporate messaging features into applications.

Active Messaging could be used, for instance, to add collaborative discussions to a Web site without custom coding, sources

"It sounds like [Active Messaging] could save development time," said Greg Scott, information systems manager at the College of Business of Oregon State University in Corvallis, Ore., a large Exchange site.

Exchange 5.0 — previously dubbed Version 4.5 — will ship at the end of January. The new release will also support Post Office Protocol 3 and Lightweight Directory Access Protocol. It will include a connector for Lotus Development Corp.'s CC:Mail.

## Tool promises Web authoring without HTML

By Matt Hamblen

MACROMEDIA, INC., which makes the popular Shockwave World Wide Web authoring tools, today at Internet World in New York will unveil a publishing tool that lets webmasters create interactive business applications without writing Hypertext Markup Language (HTML) scripts.

Backstage Internet Studio 2.0 is being tested by Sam's Club, a subsidiary of Bentonville, Ark.-based Wal-Mart Stores, Inc. Online development manager Marcus Carruthers uses the product to create an interactive training area on the corporate intranet.

"It really makes it extremely easy for a novice to create applications," Carruthers

Backstage Internet Studio 2.0 includes an HTML editor with a point-and-click interface, maintenance software that can support multiple sites, an object server that works with any Web server and a group of 16 objects for creating database access and interfaces.

## **Backstage Internet Studio 2.0 "really** makes it extremely easy for a novice to create applications."

## - Marcus Carruthers, Sam's Club

Joan-Carol Brigham, an analyst at International Data Corp. in Frisco, Colo., said that although Netscape Communications Corp. and Microsoft Corp. also provide effective authoring tools, Macromedia's package does the work visually without requiring HTML programming. It embeds the HTML code in the objects, which are then accessed via the drag-anddrop graphical interface.

## SIGN OF THE TIMES

Managers at 435 Sam's Club locations will be able to use the site to access instructions on the proper way to hang signs in their stores. When properly placed, the signs give customers a clear view of the entire store. There's a clear advantage in showing the store managers how to do it graphically on an interactive site, Carruthers said.

"I think we are definitely going to be using [Backstage Internet Studio 2.0] quite a bit," he said.

The only downside to the product, he added, is its "pretty high price" of \$999 for an enterprise version, which he said he hopes Macromedia can eventually reduce with more users.

Carruthers said the success of Shockwave products — first introduced in 1995 and a key factor in bringing interactive video and graphics to the Web - gives the new product more credibility.

At Toronto-based Grand & Toy, a subsidiary of Boise Cascade Office Products, Inc., the product has been in limited use for a few weeks.

The company is putting an electronic ordering catalog that is used in its company network online with the tools, said Alan Berdowski, vice president of marketing.

"It was a relatively easy process that took probably a month," Berdowski said. "The product has performed, but we're cautious and have only set it up with a pilot customer."

That customer, a major Canadian university, can go online and procure any of 5,000 office products based on the pricing it has negotiated with Grand & Toy. If the pilot effort continues to go well, more customized customer catalog sites will be added in January, Berdowski said.



## It's More Than Dots & Dashes...

**T**oday's information age began with the invention of the telegraph by Samuel Morse in 1837. And just as the familiar dots & dashes have come to symbolize Morse Code, Innovation Data Processing symbolizes cost-effective, fast, safe and reliable storage management solutions.

Joining forces with EMC Corporation and the Symmetrix® Enterprise Storage Platform (ESP), Innovation paves the way to a disaster recovery solution for open systems and LAN SCSI disk & database volumes to S/390 tape or disk directly across high speed mainframe channels without using network communications.

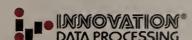
As you turn to open systems for business critical applications and as database systems continue to grow at incredible proportions, requiring hundreds of gigabytes and sometimes terabytes of disk storage, protecting this information is today's challenge.

With FDRSOS, your lifeline to Safeguarding Open Storage, large databases can be protected at ultra high speed and with reliable performance.

A typical user with a 100 GB database using a standard package currently requires 24-48 hours to backup to local DAT tapes. But with FDRSOS's advanced technology, you can backup as much as 50 GBs per hour per tape control unit. And, in the case of disaster, recreate SCSI volumes concurrently without having UNIX machines or PC's operational or communicating.

High-Speed ··· Reliable --- Cost-Effective ··· Storage Management Solutions

Backup Open Systems to Mainframe: AIX® (RS/6000)™, HP-UX, UNIX®, SUN Solaris™, WindowsNT™, NetWare® and OS/2®



CORPORATE HEADQUARTERS: 275 Paterson Avenue, Little Falls, New Jersey 07424 • (201) 890-7300 Fax: (201) 890-7147 • E-mail: 76322.2076@compuserve.com • http://www.innovationdp.tdr.com

FRANCE **OFFICES**: 01-47-69-15-15 089-489-0210

**GERMANY** 

NETHERLANDS 036-534-1660

0181-905-1266

UNITED KINGDOM NORDIC COUNTRIES

## Web site development tool takes it a step further

By Justin Hibbard

NETOBJECTS, INC. is about to test whether it can avoid the dreaded sophomore slump.

The year-old firm will release Fusion 2.0 at Internet World '96 this week in New York. It is the second version of the popular World Wide Web site development tool, which was unveiled three

months ago. Users praised Version 1.0 and welcomed the new features in Fusion 2.0, though one developer said the new release lacked the major improvements he sought.

Fusion 2.0 has been positioned as a site management and authoring tool. It will be able to import entire Web sites or portions of sites. Developers will be able to suck in pages created with other tools and apply Fusion 2.0's drag-and-drop site management features to them.

"In the past, Fusion was a wonderful way to lay out a site," said Bob Gill, an analyst at Gartner Group, Inc. in Stamford, Conn.

"If you wanted to author in HTML [rather than use Fusion's WYSIWYG edi-

tor], you had to import page by page. Now it's easier to use some other tool to author your pages and then import," Gill said. But Brian Howard, direc-

Forrester Research, Inc. predicts that the Internet sitebuilding software market will grow to \$1.2 billion by 1999.

tor of infrastructure technology at Pacific Bell Communications in Pleasanton, Calif., said Fusion 1.0's ability to import pages into Fusion's page templates already serves his needs.

"The thing I was really waiting for was improving database connectivity and collaboration," he said.

Howard said he found the new features useful, but said they seemed like minor modifications. "If you're going to call something a 2.0 release, I would think that it has to have some kind of major new feature they're adding.'

A feature that caught Gill's attention was NetObjects NFX Components, a set of 10 components that developers can embed in their Web pages by using dragand-drop commands. An especially useful component, Gill said, is the threaded discussion group, which lets users create a basic bulletin board system on a Web page. "You could use it as a simplified way for people to give feedback on products without having to submit forms," he said.

## **DIAGRAM FEATURE**

The ability to print diagrams of sites was the favorite new feature of Scott Allen, a project manager at Genuity, a Bechtel company in San Francisco. "Clients appreciate it because you can show them the flow diagram and then just move the items around [in Fusion]," he said.

Allen also said he didn't see any new features that seemed like major revisions. But he said he noticed an overall improvement in the product. "Hands down, this is the best product I've ever run into that helps me do what I want to do," he said. "When [Release] 2.0 comes out, I'm expecting just a tighter version of what I've already got."

Fusion 2.0 will be available to Fusion 1.0 customers for free when downloaded from NetObjects' Web site, and for \$49.95 when ordered on CD-ROM with documentation.



## The PUNDITS and PUNDITS and Pundirions are making lefty predictions.

for computing's are making lofty predictions

## These guys are LIVING IT.

They're visionaries, all right—but their feet are firmly planted in the business world. And their company, a \$4.5 billion healthcare concern, is already reaping benefits from a long-term, trend-setting solution co-created with services from Microsoft Corporation and Digital.

Two mergers in three years left FHP with fragmented information systems and soaring support costs. So Margolis and Bowen, side by side with teams from Digital and Microsoft, mapped out a broad integration strategy comprising a standardized PC desktop and network, a single transaction system (down from a dozen) and streamlined information access.

"We did an extensive evaluation of server platforms," says Bowen. "AlphaServer™ systems running Microsoft® Windows NT™ Server scored highest in features and reliability —with the lowest cost of ownership." Those servers will ultimately support more than 50 FHP sites and thousands of Windows®

based Digital PCs running Microsoft Office, all linked by a robust Microsoft Exchange Server messaging backbone. JEFF MARGOLIS
Senior VP, CIO
PHP INTERNATIONAL CORP.

Information Services Director
FHP INTERNATIONAL CORP.

The results thus far: "Employees are empowered to create solutions to business problems," says Margolis, "and those solutions are easily shared across locations." Moreover, improved information access has meant better customer service—while FHP's benchmarked computing cost per customer has dipped to 20% below industry average.

Bowen credits the project's success not just to superior products, but to "the exemplary relationship we enjoy with Digital and Microsoft." Make this kind of success part of your company's future. Call 1-800-332 4403 today

(U.S. and Canada only) or visit www.alliance.digital.com.

A L L I A N C E
FOR ENTERPRISE COMPUTING

Microsoft digital

## HR to IS: Resistance is futile

▶ Blue Cross group acts solo in client/server switch

By Randy Weston

WHEN THE HUMAN resources department of Blue Cross/Blue Shield of New Jersey decided to migrate to client/server technology from a mainframe system, it didn't let anything stand in its way — including the information systems department.

Despite lacking the technological know-how — and heavy opposition from IS — Blue Cross' human resources officials met with vendors, chose an application package, trained themselves in development tools and installed the hardware and software.

## IS "spent \$25,000 for an outside analyst to look at the project. The report agreed with us."

## - Joseph Donald, **Blue Cross/Blue Shield**

"We tried to get the IS folks to go with us and look at vendors, but after one or two meetings they stopped going — so they were self-selected out of the process," said project leader Joseph Donald, director of benefits and compensation at the Newark, N.J.-based company. "They felt they could just enlarge the old [McCormack & Dodge mainframe] system. So they were left running the old system while we set up the new one.'

IS officials from the company contacted by Computerworld didn't respond before deadline.

## **UP AND RUNNING**

On Aug. 2, 1994, the old system was switched off, and the health maintenance organization's 60 human resources department employees began using PeopleSoft, Inc.'s human resources applications to manage 4,000 active employees and 18,000 retirees. And the project came in \$300,000 below its \$1 million

The software has been upgraded four times since then and the hardware twice, with little help or at times outright opposition from IS. But Donald said the system was installed with barely any customization, and an outside consultant was brought in to customize a report-writing application that needed to be tied to the system.

"IS at the last minute said we couldn't buy anything without their approval," Donald said. "So they spent three weeks and \$25,000 for an outside analyst to look at the project. The report agreed with us."

From the beginning, Donald said, he knew conducting the project in such a hostile environment was sure to result in personnel losses. About a half-dozen people in his department and IS couldn't make the transition.

People quit, were fired or were transferred to departments that still ran mainframes. But other departments are migrat-

> ing to client/server, and Donald said the mainframers are running out of places to hide.

> 'They are slowly moving themselves out of a job," Donald said. "The truth hurts, but they are still resistant, and we're getting ready to move financials over."

A small portion of the human resources staff worked full-time on the technology upgrade. The rest spent about 10% to 15% of their time during a five-month period on their specific tasks during the migration (see story at right).

## **ALL THE RIGHT MOVES**

Judith Hurwitz, president of Hurwitz Consulting Group, Inc. in Newton, Mass., said Donald's department took the right approach — even if IS was willing to go along with the project.

IS departments are often more concerned with the technology and managing it than looking at its business purpose, she said.

'Even in traditional projects, where IT controls migration to a new platform, it's important to put the control of the project in the hands of the business unit," Hurwitz said.

Donald agreed. Besides getting the job done, one of the biggest benefits was that users programmed the configurations to the exact needs of their departmental functions, he said.

The knowledge base is coming in handy. Blue Cross/Blue Shield of New Jersey recently merged with its sister companies in Delaware and Connecticut. Donald's staff is working to add the new companies to the



## Teamwork key to switch

The human resources department of Blue Cross/ Blue Shield of New Jersey needed a well-planned structure for moving to client/server technology from a mainframe.

The migration took five months and was accomplished by three groups: a management team, a user team and a systems team.

Project leader Joseph Donald said the management team included the vice president of human resources and three human resources directors, including him. The management team wasn't involved in the daily operations but was held accountable for the project's overall success.

The user team — which was composed of direct users of the new system, including the labor relations manager - was trained in PeopleSoft's Tools I development software. The group was charged with configuring the software to meet its department's needs.

"Three of the seven people on the user team

had never turned on a PC before the start of this project," Donald said. "We made them go through a Word for Windows course to get them comfortable with point-and-click technology. Then they sat down and decided what would and what wouldn't go into the new system, and they made the configurations themselves."

Donald estimates they spent about 10% to 15% of their time during that five months on the migration project. The rest of their time was spent on their normal human resources-related duties.

The systems team worked full-time on the project and took on the duties usually handled by IS. The team was composed of several department managers, such as the manager of compensation. The team was also trained in PeopleSoft Tools II advanced development software. It advised the user team on how to do configurations, approve configurations and coordinate and moderate the project to make sure it was done on schedule. It also ran the upgrades and did the majority of training. — Randy Weston

## Cyberclash over cybercash

ELECTRONIC COMMERCE on the Internet may be a reality, but users still don't have a high level of trust and secu-

rity in online transactions.

Two companies last week separately announced plans to change that.

New York start-up CertCo LLC, a spin-off of Bankers Trust Co., unveiled a plan to create an infrastructure that will let banks conduct secure online transactions that are fully insured and can be audited.

CertCo also plans to release CyberCoin, which handles micropayments online. An example would be banks that charge users a penny to access their accounts. The digital payment scheme is based on a model that

combines public- and privatekey cryptography in a system that distributes liability and security among several parties.

CertCo is expected to butt

heads with CyberCash, Inc., which already has support

from most major banks.

## **BANK ON IT**

INTERNET

SECURITY

Past discussions of how businesses would bypass banking institutions and offer services directly are proving to be "nothing more than a fallacy," according to Chris Stevens, an analyst at Aberdeen Group in Boston. "Trust institutions are stronger on the Internet than anywhere else because they already have an established infrastructure for doing online transactions."

And VeriSign, Inc., which of-

fers a handful of digital authentication products, has announced partnerships with 10 companies that plan to invest a total of \$30 million in the Mountain View, Calif., firm. The funds will help VeriSign expand its line of digital identification applications.

VeriSign plans to embed digital authentication technology with key encryption into applications that are developed by its partners. The partners include Cisco Systems, Inc., Comcast Corp., First Data Corp., Gemplus Cards International, Intuit, Inc., Merrill Lynch & Co., Microsoft Corp., Reuters, AT&T Ventures and SoftBank Ventures, Inc.

"VeriSign has assembled an impressive array of partners, and they are obviously some big players," Stevens said.



and efficiently identify and fix your date problems across an entire system — all from within a single window on your PC. Then, you can compile and test changes back on the mainframe,

Micro Focus' Challenge 2000 Consulting Services for project management expertise and expert training courses—all scaled to meet your individual needs.

Call Micro Focus today at

1-800-632-626 and ask

for your free Revolts/2000

demo disk or visit us ou:

Transforming Enterprise Systems MICRO FOCUS®

## Mail clients lose hold

Users are pushing for browser access to messaging servers because it lets them easily fetch mail from the road and access multiple mail servers.

What may be a boon for users could leave information systems managers cold. Concerns revolve around support nightmares, increasingly browsers, application development issues and a lack of control over what users run on the desktop.

ents from mail servers," said David Marshak, a vice president at Patricia Seybold Group, a market research firm in Boston.

Mail clients are generally proprietary applications that exploit a full array of accompanying back-end messaging servers. Browsers, on the other hand, provide basic mail features, work with an array of mail servers and generally require fewer desktop resources.

The dominant messaging

## Microsoft will soon begin offering Outlook, its mail and groupware client, it also plans to give users the option of running browsers with Exchange.

## **FLEXIBILITY IS GOOD**

"The flexibility to go with either a Notes client or a browser is a good thing," said Tim M. Crawford, a technical project manager at National Semiconductor Corp. in Santa Clara, Calif., a large Notes shop. But touting browsers as light clients may not hold true anymore, he said.

works that will add some of the

choicest features of mail clients to most browsers. And although

"[Netscape's] Navigator, the browser we support here, can be fat if you add a lot of [specialized] plug-ins and goodies," Crawford said.

Also at issue is the fact that mail clients and Web browsers don't have the same mail server functionality. As a result, applications developed for a proprietary mail client can't be easily deployed to browser users.

"Before we do any development, we have to know whether our target users have Web browsers or Notes clients, and we'd like that to change," said Motti Goldberg, chief architect at US West, Inc. in Denver, a big Notes shop.

"The automated replication add-ons and Java applets [in the works from several messaging vendors] will be difficult to support and have a lot of security issues," said Blane Woodard, manager of IS at Northwestern Mutual Life Insurance Co. in Milwaukee.

INTERNET TECHNOLOGY

## HP creates framework for building intranets

By Jaikumar Vijayan and Mitch Wagner

HEWLETT-PACKARD CO. last week fleshed out details of an initiative to help companies deploy Internet technology.

HP's "electronic business framework" incorporates new and previously announced Internet-related products and services - including third-party products - that it will help integrate into corporations.

"They certainly seem to have many of the capabilities that are going to be necessary to help customers develop electronic commerce sites," said Tom Kucharvy, president of Summit Strategies, Inc. in Boston.

"But the packaging is confusing. It would have been a lot clearer if they had actually demonstrated how exactly some of the things they announced are going to be employed," he said.

"They openly showed us what they are doing. We understand the architecture, and we are pretty pleased" with HP's Internet strategy, said George Steinhoff, vice president of group systems at Blue Cross of California in Woodland Hills.

Blue Cross is upgrading several customer service centers. The company is using a World Wide Web-enabled product that

## HP'S 'NET MOVES WILL:

- Develop products and services to help companies deploy Internet technology
- Work with Microsoft to develop a version of NetPC and Web-enabled PC management software
- Work with Oracle and Verifone to develop products for secure electronic commerce
- Web-enable existing HP products and services

integrates the Internet with telephony-based customer-service offerings.

## **COMING SOON**

The following products are slated to be delivered by HP in the first quarter of next year:

- ■HP's Process Management Development framework for intranets, which will let groups create and adapt solutions that map to and evolve with business-process requirements.
- ■HP's Internet Marketing framework, which improves communication among customers and business partners over the Web by delivering personalized product and service infor-
- ■HP's AdminFlow framework, for business-to-business Web commerce, which lets firms document, automate and deploy scalable administrative business processes via standard Internet communications protocols.

Third-party Web tools can be snapped in to each of the frameworks. HP last week said it has also Web-enabled several of its products. It will soon ship an Internet-ready version of its Smart Contact software. The product integrates the Internet with telephony-based customer-service offerings.

HP also announced plans to jointly develop with Verifone, Inc. a range of Internet-based secure-payment products. HP and Verifone announced a joint development alliance earlier

## Traditional mail clients Pros Cons ■ Rich functionality Expensive

**WEIGHING YOUR CLIENT OPTIONS** 

- Able to exploit back-end features of mail server
- Fat client

## Web browsers Cons

- Lightweight client On many desktops
- Can't exploit all the back-end features of mail servers
- Requires frequent upgrades

On the plus side, IS managers applauded client choices for mail servers and said browsers will work for many users.

Either way, they are bracing themselves. "We are moving toward the separation of mail clivendors — Lotus Development Corp., Microsoft Corp. and Novell, Inc. - recently have anvell have Java applets in the

nounced plans to broaden the choice of clients that can run with their servers. Lotus and No-

## Make Systems beefs up suite of network analysis tools

By Patrick Dryden

MAKE SYSTEMS, INC. this week will enhance its suite of network analysis and design tools to help corporate planners prepare their networks for the impact of transaction-oriented client/server applications.

Such applications require constant availability and guaranteed response time.

And corporations need such tools to understand connectionless networks and check up on transaction response times.

Release 2.6 of NetMaker XA tackles problems such as tracking overall performance, migrating SNA traffic onto routers and modeling frame-relay circuits to reveal the most costeffective connections.

Those new capabilities ad-

dress demands from corporate users deploying critical Baan Co., PeopleSoft, Inc. and SAP AG R/3 applications, said Steve Howard, president of Make Systems in Mountain View, Calif. Traffic simulations for these applications by an aerospace firm, which asked to remain anonymous, revealed delivery problems that would cripple reliability as soon as managers extended access beyond regions to users across the wide-area

At R. R. Donnelley & Sons Publishing Corp., the capabilities of NetMaker XA 2.6 specifically help predict how new applications will perform on the 120-router frame-relay network and how they will affect such applications as electronic mail and production planning, said

and E-mail." - Asoka De Saram, network engineer, R. R. Donnelley

'We needed a way to see how higher traffic

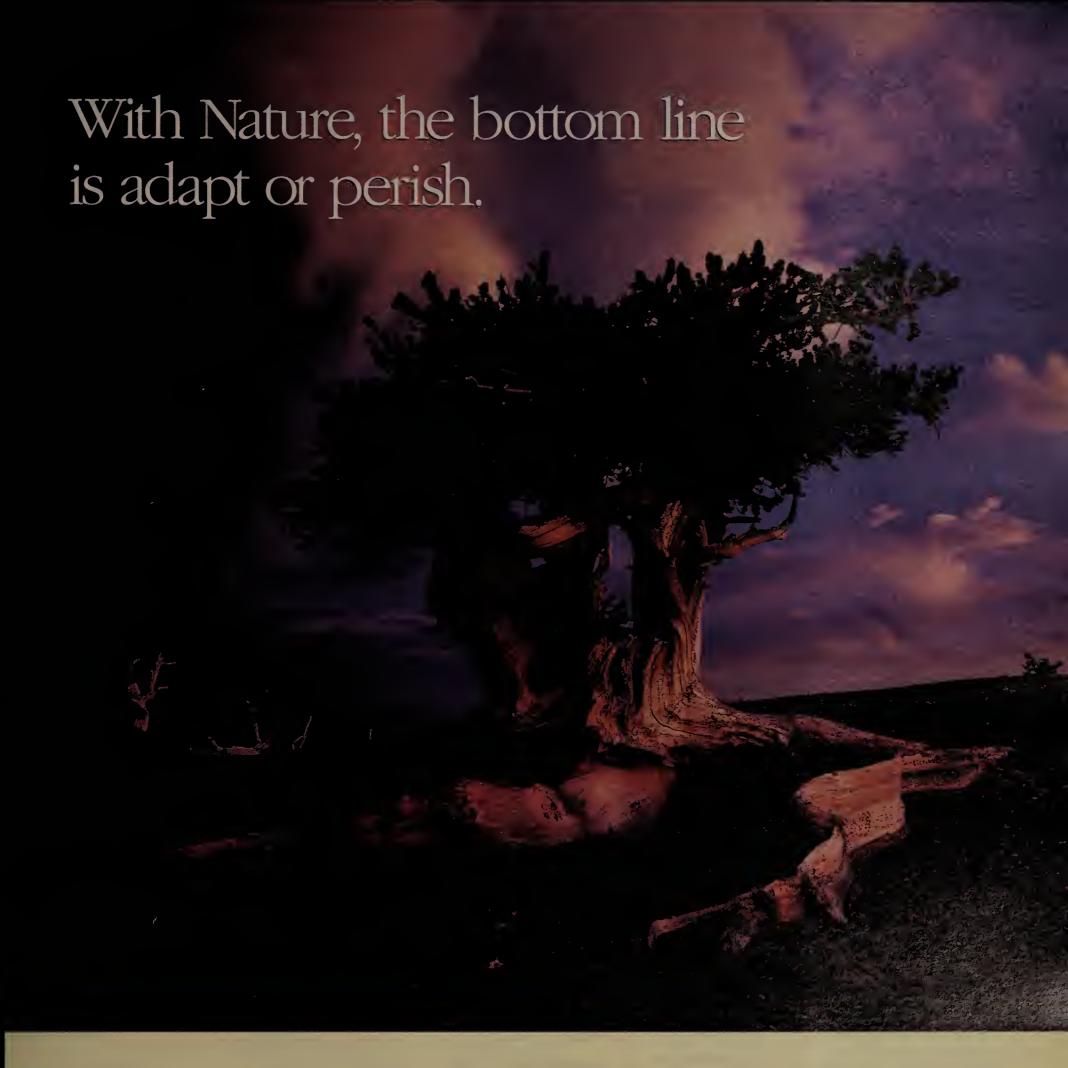
levels will affect production planning applications

Asoka De Saram, network engineer at the Chicago-based printing company.

'Now we don't have to plug in a probe or analyzer at every site to monitor traffic and router interfaces," De Saram said. Net-Maker XA automatically gathers basic utilization information without probes and presents graphical baseline activity reports. It also models frame-relay scenarios, "so we can optimize performance and cost," he said.

Modeling and planning software is also available from such vendors as CACI Products Co. in La Jolla, Calif., and NetSys Technologies, Inc. in Palo Alto, Calif. With this release, Make Systems has caught up in the frame-relay and SNA design areas, noted John Morency, a principal at The Registry, Inc., a consultancy in Newton, Mass.

Pricing for NetMaker XA modules ranges from \$6,995 to



## Funny how the bottom line never seems to change.







Result-driven modeling



RAD C++ Leading 4GL

Multi-platform C/C++

Change is constant, rapid and often revolutionary. Your ability to adapt, then, is the difference between leaping ahead and being left behind. The Powersoft family of comprehensive tools will keep you in step. Multi-platform capabilities and database independence allows you to design in a chosen environment and deploy anywhere, including the Internet. Visual Components™ galleries provide core functionality for your business applications. Common object-oriented architectures leverage existing systems and combine seamlessly with emerging paradigms. And all enable you to meet evolving technologies head-on with the power and agility that makes keeping up easy, moving ahead possible, and Powersoft the natural selection. We have industry-leading tools for every type of professional developer. For information on each, or to place an order,

call 800-395-3525. Or visit www.powers oft.com.

## PeopleSoft adds Red Pepper to mix

By Randy Weston

SAN DIEGO

PEOPLESOFT, INC. plans to spice up more than just its manufacturing applications with the technology gained from acquiring Red Pepper Software Co.

PeopleSoft in Pleasanton, Calif., is looking at ways to use the constraint-based planning engine developed by Red Pepper in other applications, such as human resources applications for employee scheduling, officials said last week at the annual PeopleSoft user group conference here.

## SPICY DEAL

PeopleSoft in October paid \$219 million for Red Pepper, with the intent of embedding Red Pepper's ResponseAgent planning software in its products.

The technology is used by

chain and inventory manage-

The software alerts users when supplies are getting low based on a preset plan.

## MORE USES

Red Pepper and PeopleSoft officials don't see why the same technology couldn't be used for managing people in industries such as health care, where people are the main commodity.

"In hospitals, you have a finite capacity of nurses, physicians, operating rooms and things you do on patients. It looks an awful lot like the standard capacity constraints manufacturing plants deal with," said David Obershaw, director of business development at Red Pepper in San Mateo, Calif.

Obershaw said the constraint engine was designed to make

manufacturing firms for supply-quick adjustments to a preset schedule. In the hospital example, if a major incident such as the Oklahoma City bombing occurred, the software could be

> If a major incident such as the Oklahoma City bombing occured, the software could be used to quickly reconfigure staffing, supply and space contraints.

used to quickly reconfigure staffing, supply and space con-

No immediate product releases are planned. Obershaw said users should expect to see the technology, possibly in 1998, in the release of People-Soft 8.

The company is rolling out

Version 6, and Release 7 should be out by the end of next year.

"Whenever you are scheduling people or those kinds of resources, it is inherently a

> changing environment," Obershaw said. "Red Pepper architected around straints, and those constraints could be anything from customer delivery dates to employee schedules."

Henry Morris, an analyst at International Data Corp. in Framingham, Mass., said he expects PeopleSoft to come up with more uses for the planning

"This clearly makes sense in other endeavors," he said. "Wherever you have human capital, you would be able to utilize this technology."

PeopleSoft is also making big pushes into government <mark>and</mark> higher education, where the software could be used to handle student schedules.

## **HUMAN RESOURCES**

At last week's user conference, a coalition of employment agency industry officials met to discuss what they wanted out of People-Soft applications.

The main commodity of many industries is people, said Buck Buchanen, vice president of information systems at Snelling & Snelling, Inc., a \$300 million employment agency in

He said a scheduling engine in human resources applications would come in handy for tracking employees sent to work in companies around the

## Legacy mini users loyal to the end

CONTINUED FROM PAGE 1

long as possible.

In fact, 64% of proprietary minicomputer users said they

LEGACY

don't intend to immediately migrate from their

current platforms, according to the survey of 100 corporations.

Poll respondents said the systems meet their business needs and applications requirements. And users said they are hesitant to incur the costs involved in moving to an untested platform

"There is a very large segment of users out there who are sitting back and saying, 'I got this computer, it works just fine, it never breaks, so why the heck change anything?"" said Ross Duncan, chief operating officer at Integration Alliance Corp. a distributor and reseller of HP 3000 systems in Englewood,

But a rising tide of relatively low-cost Windows NT and Unix systems, lack of software, waning vendor support and pressure from management all are making it harder for users to justify their actions.

'We are at a crossroads here in our company where we have to decide whether we want to stay with our legacy system or move," said Steve Pounds, controller at Security Forces, Inc. in Charlotte, N.C.

The company's Data General

Corp. hardware works fine, but getting support for its custom applications software is getting

to be a challenge, Pounds said. He said he is check-

ing to see if there are any packaged Windows applications that can do the same job.

STAY OR STRAY?

Top three reasons why

users are sticking with

minicomputers

"Such issues are a problem, but what has happened over time is that customers have found a way of staying alive," said Donald Winterhalter, an independent consultant for Wang Laboratories, Inc.'s VS systems in Plaistow, N.H.

For instance, Wang user Lamar Logan, CEO of Logan Lumber Co. in Tampa, Fla., relies heavily on third-party software and utilities vendors for almost all support.

'When Wang filed Chapter II a few years ago and a lot of people around the country panicked, we looked at our hardware and software. We found that it [could be supported], even if Wang went out of business," he said.

Longtime minicomputer users also said the proprietary systems are relatively easy to maintain, upgrade and write programs for.

"The best thing about these systems is that you don't need to learn Klingon or have a space science degree to operate the machine," said Mike Berkowitz, HP 3000 systems manager at Guess, Inc. in Los Angeles.

"I could fall asleep like Rip Van Winkle in 1975 with a tape I made of programs and data, wake up 21 years later, put in the tape, use the exact same com-

## Life at the end of the line

If other reasons don't force users of older minicomputers to migrate, lack of vendor support almost certainly will in the long term,

During the past few years, almost all major minicomputer vendors have shifted their marketing and development dollars away from proprietary boxes to Unix and Windows NT systems.

And the trend is only going to accelerate.

For instance, Digital Equipment Corp. and Hewlett-Packard insist they will continue to support their VAX and HP 3000 platforms, respectively, as long as there is demand for them to

But despite periodic product refreshes, both companies long ago stopped actively marketing those products. Meanwhile, Data General has discontinued earlier product lines and migrated to Intel Corp.-based architectures.

"Users don't have a whole lot of choice. If they are being forced to move, then obviously they are going to move," said Ross Duncan, chief operating officer at Integration Alliance.

"In many instances, customers may migrate just out of fear that their vendor may no longer be there when they are needed," said Donald Winterhalter, an independent consultant for Wang VS systems in Plaistow, N.H. "It is hard to make long-term plans when you think you are the end of a product life cycle."

--- Jaikumar Vijayan

mand and run them," Berko-

Of course, newer technologies such as Unix and Windows NT are eating away at the installed base of proprietary minicomputers. "More than an indictment of the hardware, most of the migration is happening because of application unavailability" on older platforms, said Ron Seybold, editor of "The 3000 News Wire" in Austin, Texas.

Other factors pushing users to new platforms are fears about long-term vendor support (see story above), the relative lack of interoperability with current environments, lack of applications and trained staff, and hardware capacity issues.

Perry said Avery Dennison is on the verge of moving to a Unix platform in the next 18 months because the HP 3000 simply isn't "integrated with other applications as well as it could be.

The migration won't be easy, though. "I am dreading the day when we actually have to move to a Unix box. I think I will cry," Perry said.



## **COMPUTERWORLD**

Yes, I want to receive my own copy of COMPUTERWORLD each week. I accept your offer of \$39.95\* per year - a savings of over 73% off the single copy price.

Save over 73%

irst Name MI	La	st Name	
itle Co	ompany E-r	mail address	
ddress	City	State	Zip
	ase complete the questions be	elow.	
BUSINESSAINDUSTRY (Circle one)  Manufacturer (other than computer)  Finance/Insurance/Real Estete  Medical/Law/Education  Wholesale/Retail/Trade  Business Service (except DP)  Government - State/Federal/Local  Communications Systems/Public Utilities/ Transportation  Mining/Construction/Petroleurn/Refining/Agric.  Mining/Construction/Petroleurn/Refining/Agric.  Manufacturer of Computers, Computer-Related Systems or Penpherals  Systems or Penpherals  Systems Integrators, VARs, Computer Service Bureaus, Softwer Planning & Consulting Services  Computer/Peripheral Deeler/Dist/ Retailer  Other  (Please Specify)	2. TITLE/FUNCTION (Circle one) IS/MIS/DP MANAGEMENT  19. Chief Informetion Officer/Vice President/ Asst. VP IS/MIS/DP Management  21. Dir:/Mgr. MIS Services, Information Center  22. Dir:/Mgr. Network Sys., Deta/Tele. Comm., LAN Mgr. /PC Mgr., Tech Planning, Admin. Svs.  23. Dir:/Mgr. Sys. Development, Sys. Architecture  31. Programming Management, Softwere Developers  41. Engineering, Scientific, R&D, Tech. Mgt.  60. Sys. Integrators/VARs/Consulting Mgt.  CORPORATE MANAGEMENT  11. President, Owner/Partner, General Mgr.  12. Vice President, Asst. VP  13. Treesurer, Controller, Finencial Officer DEPARTMENTAL MANAGEMENT  51. Sales & Mktg Manegement	80. Information Cent Journalists, Stud 90. Other Titled Pers	NAL MANAGEMENT lers/Libraries, Educators, lents sonnel te, specify, recommend, that apply)  (e) Mac OS (f) Windows NT (g) Windows (h) NeXTstep Products  Yes  No

## **BUSINESS REPLY MAIL**

FIRST-CLASS MAIL PERMIT NO. 55B MARION OH

POSTAGE WILL BE PAID BY ADDRESSEE

## **COMPUTERWORLD**

P O BOX 2044 MARION OHIO 43306-2144 NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES



## U.S. digital copyright proposals trigger debate

By Gary H. Anthes and Thomas Hoffman

software vendors, users and Internet service providers squared off in Geneva last week over U.S. proposals to bring copyright laws into the Digital Age.

U.S. publishers of software, books and other intellectual property are supporting Clinton administration proposals to strengthen copyright laws worldwide in order to protect publishers from electronic piracy.

But the proposals could be a double-edged sword for IS managers. Matt Cutler, president of the Webmasters Guild in Cambridge, Mass., said IS people who manage World Wide Web sites are potentially caught in the middle. If they are publishing original material, they don't want to see that posted elsewhere without permission. On the other hand, they don't want to be held responsible for copyright violation on their sites or for actions of their employees that they may not be able to detect or control.

"The 'net cuts both ways in this regard," Cutler said. "These issues have a long way to go before they are cleanly resolved."

"We believe the Clinton administration is on the verge of a serious mistake by advocating ratification of these treaties."

## - Ed Black, CCIA president

Users worry that international treaties being proposed by the Clinton administration to the 160-country World Intellectual Property Organization might tighten the screws on the free flow of information over the Internet.

Internet service providers, meanwhile, fear that new copyright laws might make them liable for copyright infringement that is beyond their ability to detect or control. They also said policing the content of traffic over their services could lead to invasions of legitimate users' privacy.

The providers "feel they're going to be caught in the middle of these disputes," said Ronald Abramson, chairman of the intellectual property and technology law practice group at Hughes, Hubbard & Reed LLP in New York.

He pointed to the Church of Scientology's recent lawsuit against Netcom On-Line Communications Services, Inc. for infringement. Internet service providers "don't want to be the deep pockets in these situations," Abramson said.

"We believe the Clinton administration is on the verge of a serious mistake by advocating ratification of these treaties," said Ed Black, president of the Computer & Communications Industry Association (CCIA) in Washington.

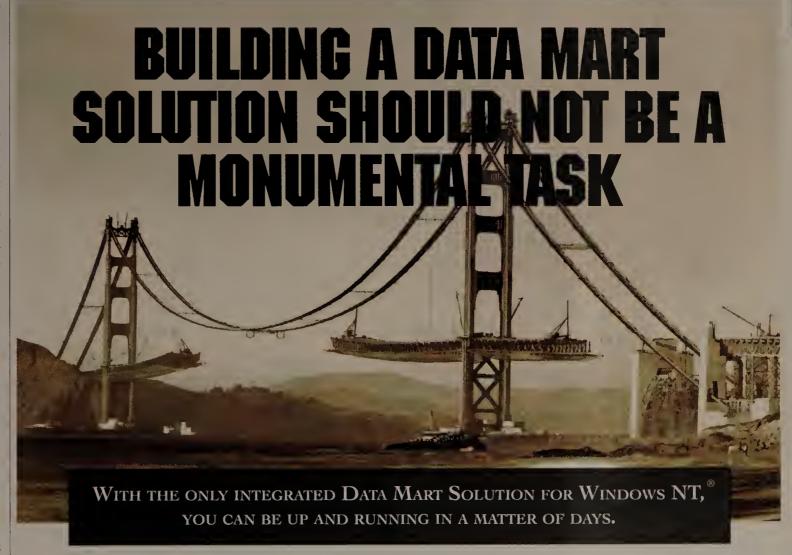
The CCIA and others said the U.S.

proposals go much too far in favor of copyright owners. For example, one provision makes it a copyright violation to make even temporary copies of material in a computer's memory while it is being viewed by an Internet browser.

But groups that support the U.S. proposals, such as the Business Software Alliance (BSA) in Washington, say critics are misreading the provisions that deal with making temporary copies on a user's computer. "Temporary copying is au-

thorized, either explicitly or implicitly," the BSA said in a statement.

The negotiations in Geneva will run an additional two weeks. Any treaty would have to be approved by the U.S. Congress.



Now the road to instant information, rapid data mart development and deployment, and easier-to-use end-user tools is here. Introducing the Sagent™ Data Mart Solution, the high-performance solution that gives you information access at speeds quick enough to satisfy your organization's most demanding users.

Sagent delivers the first 32-bit, multi-tiered, multi-threaded architecture designed specifically for Windows 95 and Windows NT client/server systems. It's designed to run tasks in parallel and cache frequently requested data, speeding up response times even more.

Thanks to a complete set of tools, the process of populating your data mart is easily automated, whether you are moving data from an OLTP system or corporate data warehouse. In addition, end users can easily build powerful information requests by dragging and dropping business terms and icons on the desktop.

And Sagent provides workgroup collaboration so end users can actively share information with each other.

To demonstrate Sagent's powerful Data Mart technology, we invite you to accept the Sagent Challenge: SAGENT WILL BUILD A FULLY FUNCTIONAL DATA MART PROTOTYPE AT YOUR SITE, AND DELIVER YOUR DATA TO YOUR USERS IN TWO DAYS.

Call us at 1-800-897-5160, extension 1011, to find out how your company can qualify for the Sagent Challenge, or for more information on the Sagent Data Mart

Solution. See just how fast you can get business critical data into the hands of those who need it.



© Sagent Technology, Inc., 1996. Sagent and the Sagent logo are trademarks of Sagent Technology, Inc. Windows NT and windows yo are registered trade in the process of the



Sure, he's sleeping.

But you're not. You're a CIO in charge of year-2000 conversions. Serious business. Analysis, conversion, testing. Hard work. But do-able, if your company's top-tier commitment to solving the problem is in place now.

If you've already looked this baby in the eyes, it's time we talked. We've got the software products and professional services to help you through the year 2000 and beyond. We'll help protect your existing assets, manage risk, enable your people, even leverage Compuware technology you may already have in place. All of this through practical, real world solutions. We'll also save you time, money and code; we don't fix what isn't broken.

And if you're one of our 9000 customers, you won't be surprised when our year-2000 conversion products keep right on working into the next millennium. Another reason why Compuware is your best choice. Call us at 800 535 8707.



Sure he's big, But *you're* bigger.



## Have your browser call my browser

By Barb Cole

FARALLON COMMUNICATIONS, INC. this week will announce software for companies that seek to get basic collaboration applications up and running on their intranets.

Netopia Virtual Office runs on desktop computers and provides a graphical application that can be accessed by colleagues and trading partners via World Wide Web browsers.

Visitors to a Netopia Virtual Office can leave voice or text messages, exchange files, participate in chat sessions or collaborate on documents.

The interface includes an office door, where visitors can affix electronic sticky notes; a conference room; in and out baskets; and a place to drop business cards.

"It's an easy way to do collaborative in-

tranet applications," said Tiernan Ray, an analyst at Technologic Partners, a consultancy in New York.

Netopia also can be used by individuals for remote access to retrieve - via browsers — files and other information stored on their PCs.

"I can see [Netopia] being used in groups or departments that don't need full-blown groupware but want to collaborate on the Web," said an information systems executive, who didn't want his name used, at Bear Stearns & Co., an investment bank in New York.

## **SMALLER APPS**

Netopia isn't likely to unseat traditional groupware. For instance, while users can have multiple visitors in their Netopia office, the software supports only pointto-point collaboration.

Netopia will be integrated with Microsoft Corp.'s NetMeeting collaboration system for users who need to work in large groups. There are plans to integrate with leading groupware products as well.

Netopia Virtual Office will ship in the first quarter and will cost \$69.95.

## **ONLINE PROTECTION**

## **Software copies** live databases

By Matt Hamblen

WHEN MCI Communications Corp. needed to make copies of customer information globally available in an instant, it turned to a small storage vendor for a solution.

For nearly a year, MCI has used Storage Computer Corp.'s online data protection software, OmniForce, at its San Jose, Calif., service center, one of four MCI centers worldwide.

Based on OmniForce's initial success, MCI hopes to deploy the software worldwide within six months, according to MCI engineers.

And Nashua, N.H.-based Storage Computer will announce today that OmniForce will be generally available in January. The software will cost between \$30,000 and \$90,000.

MCI plans to use OmniForce to duplicate four exact copies of live data in each of its four customer service centers worldwide, MCI engineers said. The purpose is to make data consistent so trouble calls can be serviced on a global basis. OmniForce's ability to function in any SCSI system made it attractive to MCI, said Jim Parkhurst, a senior staff engineer at MCI.

The ability to customize mirroring of data at multiple sites and multiple levels is a unique feature of OmniForce, according to Thomas B. Lahive, a senior analyst at International Data Corp. in Framingham, Mass.

## COMPUTERWORLD's Code of Ethics

- 1. Computerworld's first priority is the interest of its readers.
- 2. Editorial decisions are made free of advertisers' influence.
- 3. We insist on fair, unbiased presentation in all news and articles.
- 4. No advertising that simulates editorial content will be published.
- 5. Plagiarism is grounds for dismissal.
- 6. Computerworld makes prompt, complete corrections of errors.
- 7. Journalists do not own or trade in computer industry stocks.
- 8. No secondary employment in the IS industry is pennitted.
- 9. Our commitment to fairness is our defense against slander.
- 10. All editorial opinions will be clearly labeled as such.



When you pick up a copy of Computerworld, you know you're getting the most objective, unbiased news and information in IS. Our code of ethics guarantees it.

Why do we make such a big deal out of editorial integrity?

Because the words you read in Computerworld often have a dramatic impact on your business, your career, and your future.

You use this information to evaluate new products. To get a candid view of emerging technologies. To find out the inside story on corporate strategies. To decide whether to jump ship or stay in your current job. To get the edge on your competition.

In short, Computerworld is filled with the words IS professionals like you live by.

## WORDS WE LIVE BY. WORDS YOU WORK BY.

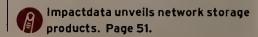
Week in and week out, our editors and reporters call it the way they see it – on issues ranging from network management to reengineering. They dig deeply to bring you the most accurate, comprehensive news in IS.

It's no wonder over 147,000 IS professionals pay to subscribe to Computerworld. Shouldn't you? Order today and you'll receive 51 information-packed issues. Plus, you'll get our special bonus publication, The Premier 100, an annual profile of the leading companies using IS technology.

Call us toll-free at 1-800-343-6474, or visit us on the World Wide Web at http://www.computerworld.com. To order by mail, use the postage-paid subscription card bound into this issue.

You'll get the kind of straightforward, impartial reporting you can work by. You have our word on it.







That not-very-boxy box pictured above is the new network computer from Sun.

Now, we're not going to get into speeds and feeds other than to say it probably performs as well as or better than what's on your desk right now. But

that's where all comparisons end. Because this folks is the Computer of the future.

You see, with JavaStations on your intranet, the bulk of your computing power resides on the network. Which means you can deploy and manage applications from one central location. We're talking unprecedented cost savings per seat,

ease of administration, built-in security and global software compatibility.

Plus, thanks to the Java platform's independence, there's no risk to your CUITENT investment in hardware or software. So, the question isn't are they going to catch on (over 60 percent of the Fortune 1000 companies are already using Java technology). It's more when are you?

For more information contact us at http://www.sun.com/station or 1-800-786+0785 47



## Can your intranet do this?

Run your mission-critical business processes

and
document your audit trails

and
maintain version control

and
manage your workflows

and
collaborate in real time?

Livelink Intranet delivers the widest range of intranet applications to help you put the Web to work.



Search massive amounts of information





and version management for all documents

Access control





The tools you need for on-time, on-budget delivery

workflows

## Introducing Livelink™ Intranet Suite 7.

It's the first and only intranet application suite that you can run your business on.

Managing today's complex business processes means allowing your managers and project teams to access, share, track and reuse information across your corporation — no matter how many sites and technologies are involved. With Livelink Intranet you can manage documents, collaborate on projects and coordinate workflow. And quickly find what you need using the world's top-rated full-text search engine. It links your people with people, and people with information, to meet your goals.

Livelink Intranet is a complete off-the-shelf application that you install and start using right away — all your people need is a Web browser. It takes your current investment in networks, databases and applications and integrates them with the Internet's global infrastructure. Finally, your intranet will support document collections of any size and handle any number of users. All with the necessary security and access control.

Industrial-strength and scalable, Livelink Intranet helps Fortune 500 and Global 2000 companies solve advanced business problems.

And it's the only one that can, and the only one that's shipping today. Contact us and we'll show you how.

"Livelink was exactly what our company was looking for...we looked at a lot of products and of all of them, Livelink was the most open and easiest to use."

Mitch Oliver, QUALCOMM Incorporated

Visit www.opentext.com or call 1 800 499-6544



Putting the Web to Work™

Compatible with Microsoft® Windows NT™.

Livelink, Open Text and "Putting the Web to Work" are trademarks of Open Text Corporation. All other trademarks are the property of their respective owners.



The workspace and resources for your virtual teams



Highlights information that needs your attention



A place to keep and organize your personal files



Monitor a project mogreat a gland



So easy to learn a d'use, you may nor need this!

## RadioLAN back on air with wireless hub

By Laura DiDio

A YEAR AFTER halting production of its first product before it shipped, Radio-LAN, Inc. is back in business.

The wireless start-up's RadioLAN 10M bit/sec. Ethernet wireless hub for intrabuilding connectivity is shipping.

The portable desktop device provides users with shared Ethernet connectivity over a narrow-band transmission in the 5.8-GHz frequency band.

The RadioLAN network links users for approximately the same cost as shared

10Base-T Ethernet hubs — less than \$500 per node, company Chairman and CEO Mike Clair said.

Targeted at campus LANs and small and remote office environments, Radio-LAN obviates the need for users to install expensive wires, Clair said. The typical

range for the RadioLAN hub is 120 feet in an office and up to 300 feet in an open, unobstructed area.

Peter Edgar, senior network analyst at the main library of the University of British Columbia in Vancouver, said the portable RadioLAN proved the ideal solution when historic preservation restrictions prevented him from rewiring the library for Internet access.

"RadioLAN gives us simple, highspeed Internet access at an affordable price point," Edgar said.

Analysts said much of RadioLAN's appeal is its simplicity and speed, which set it apart from other wireless offerings.

"It's also a big money-saver because if your business

vacates the premises, there are

WIRELESS NETWORKING

no wires to take with you, and you haven't lost your investment in existing equipment," said Skip MacAskill, an analyst at Gartner Group, Inc. in Burlington, Mass.

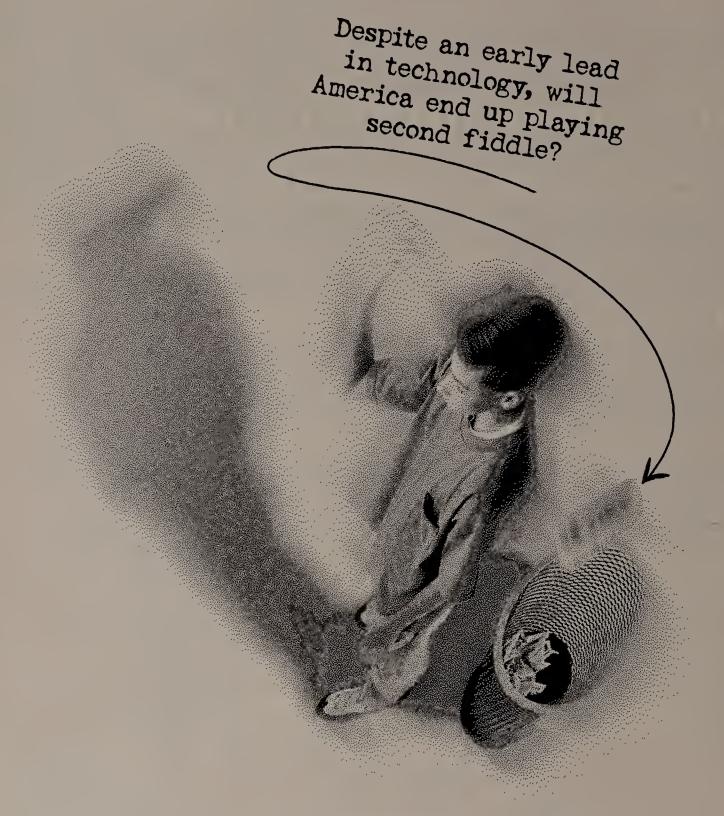
MacAskill said wireless hub-based networking is a technology whose time has come. He added that RadioLAN is the only firm shipping a full-blown wireless Ethernet product. But he warned that the company can't afford to fail a second time.

The product, originally slated to ship in May 1995, was pulled out of beta testing because the wireless signal was unreliable. At that point, the company shut down and underwent an almost complete turnover of management and engineering.

'RadioLAN has to come out smoking," MacAskill said. "They're lucky to get a second chance because no other firms have stepped in with a product to drive the wireless market. The refocus on the remote, small and home offices and the campus environment is good because it targets what will be a very significant networking market over the next several years."

The RadioLAN/10 consists of a PC adapter, a portable high-frequency radio transceiver with a built-in, omnidirectional antenna and the RadioLink wireless operating system, which is fully interoperable with Novell, Inc.'s Net-Ware, Microsoft Corp.'s Windows NT and Banyan Systems, Inc.'s Vines.

The adapter is ISA bus-compatible and comes in two versions. The Wireless Interface Node gives users a single wireless connection and costs \$499. The Wireless Access Point version lets users connect to a wired 10Base-T backbone network. It has one wireless connection and one 10Base-T connection and costs \$799.



America's IT industry. The best in the world. But we're throwing away our leadership. Because our knowledge and skills aren't being passed on to enough of our young people. Tech Corps gives your corporation a vehicle to change that. By supporting a grassroots



effort to enhance teaching and learning through technology. And give students the skills they need to keep our country number one. Discover the Sponsor. 508/620-7751
America needs to know. rewards of becoming a Tech Corps Corporate Sponsor. 508/620-7751 • http://www.ustc.org

Organizations already providing national sponsorship include Cellular Telecommunications Industry Association Foundation (CTIA). Digital Equipment Corporation, and MCI Foundation





Strength Internet
Applications. Reliable.
Scaleable. Manageable.
Deliverable today. Nobody but Forté
does this. Everybody else is trying.
If you're investing in production-grade Web
applications, you can't afford not to have a copy
of our Web White Paper. Request one via our Web
site. Or call us at 800-90FORTE (800-903-6783).
Today.

FØRTE

www.forte.com/cw

Announcing

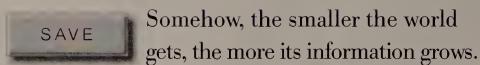
## bettersmarter

ways to

safely store all

the information

on the planet.



Each day, networked computers are making more kinds of information available to more people than ever before. From last night's sales figures to next year's economic forecasts, information is the lifeblood of business. And that makes managing and storing it even more vital.

At IBM, we're constantly thinking of new ways to maximize the value of information to your company. Part of which means understanding that different

kinds of users can have different kinds of storage needs. For some, the reliability of a 24-hour, sevenday-a-week system is critical. For others, having fast access is key. And with rare exception, cost is always an important consideration.

With all this in mind, we're adding a series of new products to our proven RAMAC™ Array Family of storage systems.

If your focus is a low total cost of ownership, the RAMAC Virtual Array Model 2 is as economical as it is flexible. If growth is on your mind, the

## fastercheaper

RAMAC Scalable Array lets you add both capacity and performance when your requirements change. Need more speed? The RAMAC Electronic Array gives users hyperfast access to stored data. And if your priority is simply the highest level of data availability, the new RAMAC 3 delivers it with twice the capacity and up to three times the speed of our earlier designs.

We're also making it easier to move into new technology. IBM\* RAMAC Data Migrator is a service that transfers data from any 3990 or compatible

subsystem to any other 3990 or compatible subsystem, with minimal downtime.

All this is backed with the IBM service and support you've come to expect.

Only better. Smarter. Faster. Cheaper.

To find out how you can get more out of storage, drop by <a href="www.storage.ibm.com">www.storage.ibm.com</a> today or call your IBM representative.

Solutions for a small planet™



Alliances to tackle electronic commerce challenges

## Going vertical for Internet business

By Mitch Wagner

LIKE CHILDREN holding hands to cross a busy street, big businesses are banding together to develop industry-specific systems and standards for Internet commerce.

Companies in heavy-equipment manufacturing, the automotive industry and electric power generation are aligning to solve electronic commerce problems specific to their industries.

For example, last month, the InfoTest International consortium demonstrated technology to build global links to 36 manufacturing companies and government agencies, including Caterpillar, Inc., Texas Instruments, Inc. and Hughes Electronics, to share business and manufacturing data.

The consortium is working to develop and standardize technologies for business-to-business sales, sharing research data, group collaboration and videoconferencing over the Internet.

Members of InfoTest, like other electronic commerce consortia, hope that pooling research dollars, technical expertise and negotiating clout with vendors will jump-start Internet commerce and save information technology dollars.

"You leverage your expenses and, probably more important than that, you leverage your expertise," said Bill Petefish, manager of information systems at the \$16 billion Caterpillar in Peoria, Ill.

Next month, some 250 public electric power utilities in 32 states plan to go live with a system for trading excess power in the Joint Transmission Services Information Network.

"Users get to test the options

"Railroad car manufacturers don't have to get involved in proprietary track widths and gauges."

Michael Goulde,Patricia SeyboldGroup

without having to run the risks themselves," said Troy Eid, executive director of InfoTest.

And the Automotive Industry Action Group (AIAG) is working on a private Internet network to link automotive companies nationwide to share business and manufacturing data. The network will be used for electronic data interchange, sharing large files of engineering data and collaboration.

## PILOT PROGRAM

The effort will begin with a second-quarter 1997 pilot that includes Chrysler Corp., General Motors Corp. and Ford Motor Co. as well as a limited number of business partners. Organizers hope to extend the network to hundreds of companies by the middle of next year.

A major benefit that these vertical industry organizations hope to create is standardization of business processes and technology.

Companies that do business with one another would be able to rely on a common set of applications for engineering, collaboration and selling, and they would know that those applications work reliably over the Internet

"There's a common look and feel," said Frank Royster, director of corporate services at Southwest Power Pool, Inc., a member of the electrical power company network. Seven World Wide Web sites set up by the network — serving different companies — will share a common user interface and behavior.

"That's the same as in any industry," said Michael Goulde, an analyst at Patricia Seybold Group in Boston. "Railroad car manufacturers don't have to get involved in proprietary track widths and gauges for the different railroad companies they sell cars to."

"You can roll in suppliers, customers and other business partners," Petefish said. "Nobody I know, except maybe the federal government, can afford a private network that goes around the world."

Some of the co-operatives may bring benefits extending beyond the organizations' vertical industries. The AIAG

## Where things stand

- →JTSIN, an alliance of electrical generating and transmission companies, will have information on excess electrical power for sale by January and hopes to be doing business deals online by late next year.
- →The AIAG, an alliance of automotive companies, is selecting an "overseer" to manage the assembly of its private network that use Internet technologies.
- →InfoTest International, a manufacturing alliance, last month demonstrated its Internet network for real-time and collaborative applications and will add additional features, including security, throughout the year.

automotive alliance plans to accredit Internet service providers reliable enough to provide service for its network and will make those findings public so that all companies looking to do business on the Internet can benefit.

Likewise, InfoTest hopes to develop a rating system for Internet service providers, with different grades of service for different applications.

## NT monitoring gains a broader view

▶ Module allows status scanning across domains

"Now I can reach

across the WAN to

network of Windows

Richard Schwartz.

**Corpus Christi** 

**Natural Gas** 

see my entire

NT servers."

By Patrick Dryden

will gain a much-needed view into their Windows NT systems with a module that BindView Development Corp. in Houston will introduce this week for its

BindView Enterprise Management System.

Currently, administrators must focus on one server or domain of servers and stations at a time to check the resources, configuration and security Microsoft Corp.'s Windows NT operating system.

From a BindView EMS console, administrators will be able to scan automatically the status of all Windows NT systems across domains, as well as check

up on servers running Novell, Inc.'s NetWare.

"This frees up a lot of my time because I don't have to jump among different NT tools and domains and do lots of the computation myself," said beta tester Richard Schwartz, net-

> work administrator at Corpus Christi Natural Gas Co. in Houston.

Schwartz said he can query BindView EMS to analyze disk space utilization and file ages on 15 servers across three domains. He said he gets one clear report that highlights "the sloppy users."

Microsoft promises to simplify large-scale Windows NT management by combining domains in a tree structure — like Novell's directory service —

through its Active Directory for Version 5.0, due late next year, said Shilpa Agarwal, an analyst at Giga Information Group in Cambridge, Mass.

## FOCUSED VIEW

"That will change the entire management scene for Windows NT, but Microsoft is not there yet," Agarwal said. "Bind-View already provides a more unified view of fragmented domains."

An enterprisewide view could ease management of more than 200 Windows NT servers throughout Houston-based Pennzoil Co., said Sue Darte, connectivity specialist at the company.

"That definitely sounds helpful to examine services through an exception report, instead of waiting for users to call or examining each server," Darte said.

The module ships next month.

Pricing will vary depending on the number of servers and workstations to be monitored. BindView EMS costs \$695 per console.

## Middleware safeguards data transactions over the Web

By Tim Ouellette

NEW ERA OF NETWORKS, INC. this week will announce message-oriented middleware that ensures delivery of transactions initiated by Web browsers.

Message-oriented middleware transports data between different applications by way of queued messages, so if the destination server is down the transaction is not lost. Instead, the message waits in a queue.

## **NO ADD-ONS**

The new Neonweb software installs on any Web server and requires no Web browser add-ons. Neonweb turns the Web server into a messaging node connected to the Englewood, Colo., firm's Neonet 3.0 middleware.

As a result, users buying stocks over the 'net, for example, can be guaranteed delivery of the transaction to whatever back-end system is processing the purchase, even if the browser loses the Internet connection.

Other middleware vendors are also looking to bring Web data into their messaging systems. For example, IBM is developing Java hooks for its MQSeries product.

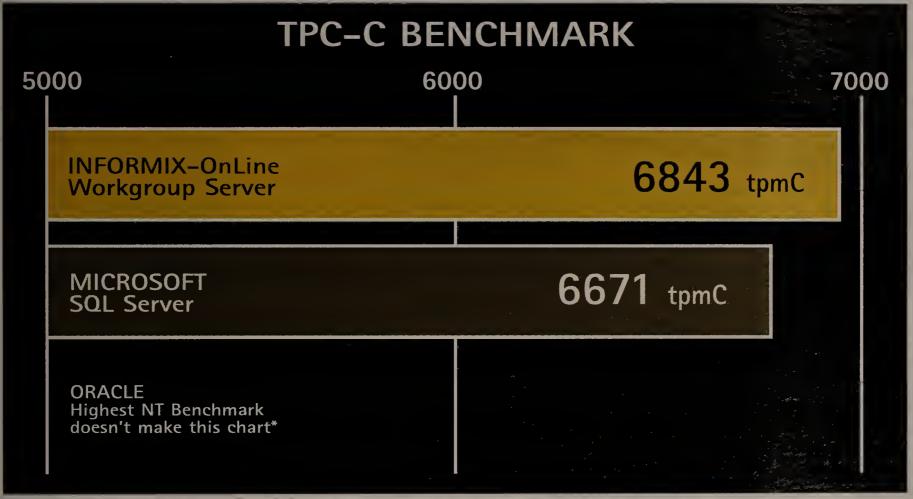
Analysts say New Era's inclusion of a rules engine helps it more easily adapt to new data types such as Web-based files.

The engine can translate new data formats between applications, while competing products such as MQSeries require specific gateways to move data out of specific kinds of applications, said John Rymer, a senior analyst at Giga Information Group in Cambridge, Mass.

Jane Grad, vice president of information technology at Ingalls Health Systems, hasn't tried Neonweb. But based on New Era's Internet integration done for the Illinois health care network, she said she expects the product could help.

Neonet 3.0 is shipping now; it starts at \$18,000. Neonweb will be available next month.

## Introducing the new record holder in database performance on an NT Server.



TPC-C benchmark results based on client/server application performance on a Compaq ProLiant 5000/6/200 Model 2 running Microsoft Windows NT Server 4.0.

\*Oracle 3066 tpmC benchmark based on Windows NT 3.51 on Compaq ProLiant 4500/133 Model 2c/s. Informix OnLine 7.3 \$100/tpmC available 2/1/97.

Microsoft SQL Server \$90/tpmC available 12/1/96. Oracle 7.3 \$198/tpmC available 6/30/96.

## INFORMIX°OnLine Workgroup Server. Proven the best database for Windows NT°.

In the most recent TPC-C benchmark, INFORMIX-OnLine Workgroup Server set the all-time performance record for databases running on a Windows NT Server.

Higher than anything Microsoft or any other vendor has ever achieved. And while the Windows NT world may be surprised, we're not.

Speed is just one measure of the power of the OnLine Workgroup Server. It's also completely Web-ready with Netscape®'s industry leading software, cross-platform compatible with UNIX, and has replication and system management built right in. No other vendor can match that performance, either.

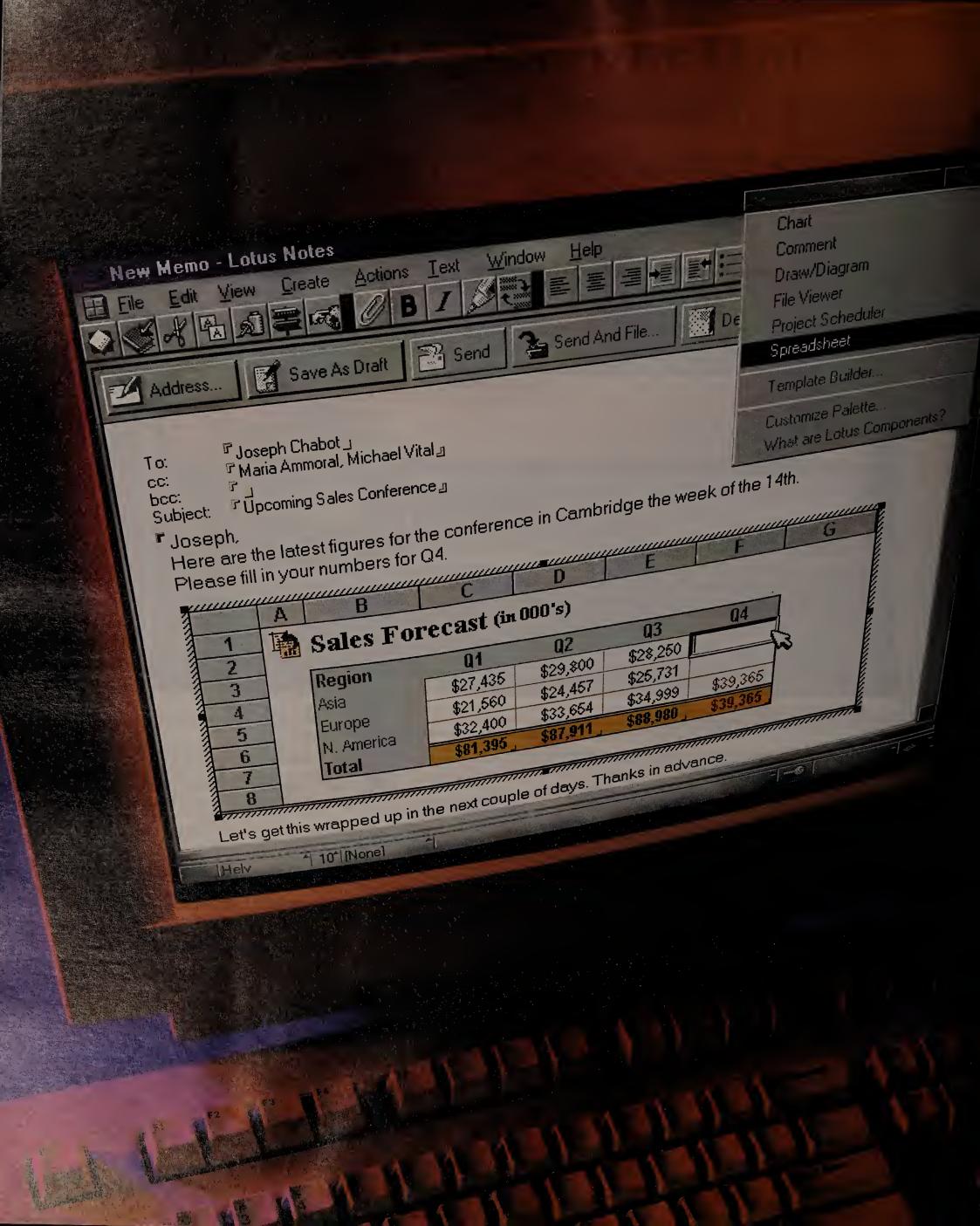
And for all that power, it's still easy to install, easy to configure, easy to use, and easy to administer. Not to mention easy to afford. And since it's built on Informix's exclusive Dynamic Scalable Architecture™, it can grow to accommodate any size department.

But don't just go by the numbers. Go by experience.

Visit our Web site at www.informix.com/wgs and download the OnLine Workgroup Server for a free 60-day trial. Or call 1-800-274-9464 and ask for it on CD. And set a few workgroup performance records of your own.

INFORMIX®

Unleashing Business Innovation™



## LOOK WHAT THE MOUSE DRAGGED IN.

YOUR E-MAIL WITH NEW LOTUS COMPONENTS INTER-ACTIVE APPLETS. Do you have a few seconds? Now that's all it takes to add different types of information to a document.



Forget wasting time launching another application in the middle of a document. These six little applets give you exactly the tools you need – and an easy way to access them – so you can get the job done faster. Just point and

click. And the component you want appears instantly, right in your document.

We've honed each one to focus on the tasks you perform most often, and we've left out the features you rarely use. So your computer doesn't get bogged down loading software you don't really need. And you don't get bogged down waiting.

Just pull down the menu and select what you need: Spreadsheet, Chart,



Draw/Diagram, File Viewer, Project Scheduler, or Comment. You can link components together, so changes in the spreadsheet automatically change the chart. You can link them to outside databases. You can even import and export files from other desktop applications.

New Lotus® Components™ business applets. When you need something in a hurry, let the mouse fetch it for you. They're available now for Lotus Notes® and will soon be available for Web applications. For more information, and to receive your free Lotus Component Discovery CD please call 1-800-TRADE-UP, ext. C732 or visit our website at http://components.lotus.com.

In Canada, call 1-800-GD-LDTUS. ©1996 Lotus Development Corporation, 55 Cambridge Parkway, Cambridge, MA 02142. All rights reserved, Lotus, Working Together and Lotus Notes are registered trademarks, and Lotus Components is a trademark of Lotus Development Corporation. All other products are registered under their respective companies.

## Computer Industry

## Bay CFO steps down

Just when turmoil appeared to have ended at Bay Networks, Inc., the internetworking vendor announced last week that Chief Financial Officer William J. Ruehle plans to resign once a successor is found. The Santa Clara, Calif., maker of switches, hubs, routers and remote access gear recently ended a six-month search to replace CEO Andy Ludwick with former Intel Corp. executive David House. And Chairman Paul Severino recently relinquished his post. Ruehle joined SynOptics Communications, Inc. in 1987. In 1994, SynOptics merged with Wellfleet Communications, Inc. to form Bay Networks. "I decided that after nearly 10 years, it was time to transition to something new," Ruehle said in a prepared statement.

## <u>Fore tames Nemesys</u>

ATM switch powerhouse Fore Systems, Inc. plans to bulk up its video networking products with the acquisition of Nemesys Research Ltd. in Cambridge, England. Fore didn't disclose the value of the sale. With Fore's Asynchronous Transfer Mode (ATM) switches and Nemesys' video coders/ decoders, the vendors intend to provide users with everything needed to set up super high-speed video networks for distance learning, telemedicine and videoconferencing applications. Nemesys will become Fore's video and audio systems development group.

## Riechers cashes out

After one year at CyberCash, Inc., CFO Gene Riechers late this month will leave the company to head a new venture capital fund. CyberCash is a developer of software and services for financial transactions over the Internet. Riechers will become the managing director of Pegasus Venture Partners L.P., an affiliate of Fiedman, Billings, Ramsey & Co. The firm will focus on early- and midstage technology companies, Riechers said, particularly those involved in Internet and electronic commerce development.

Internet push takes center stage

## Microsoft widens inner circle

By Laura DiDio

IN A BID TO better address the Internet and intranet markets, Microsoft Corp. last week revamped and expanded its top management team.

The software giant replaced its seven-member Office of the President with a nine-member Executive Committee.

New to the executive committee are senior vice presidents Jim Allchin and Brad Silverberg, who have been at the forefront of Microsoft's operating system and network operating system product launches during the past two years.

## **FINDING SYNERGY**

A Microsoft spokeswoman said the management realignment was designed to bring synergy to the company's operating system, desktop application and Internet efforts. "Customers have been telling us for some time that they want to see greater in-



Heads Internet client and applications group

tegration among our various product groups. The Executive Committee will let us create a structure to meet those technical challenges," the spokeswoman said.

As head of the Personal and Business Systems group, Allchin will assume responsibility for server application programming development, the Microsoft spokeswoman said.

And Allchin will take over some of the Internet server development, including the Com-



Leads server development, some Internet projects

mercial Internet System (formerly code-named Normandy) and the Merchant Server. Both of those products were under Silverberg's control.

Silverberg, who oversaw the Windows 95 launch last year, will lead Microsoft's Internet client and applications group. He also retains authority over the Microsoft Office suite of desktop applications, the tools division, the World Wide Web authoring product unit and developer relations.

"It's a good move because Microsoft hasn't done a great job of integrating their various product lines. The addition of veterans like Allchin and Silverberg to the management team should help them to get their house in order and align the products," said Fred Wadler, an analyst at Guilford Partners, Inc. in Chicago.

## RAPID EFFORT

Until recently, Microsoft's Internet initiatives — particularly its Web browser — have lagged significantly behind market leader Netscape Communications Corp. But the Redmond, Wash., firm is working furiously to catch up via enhancements to its browser and Internet Information Server, which are integrated into the core Windows NT Server 4.0 platform.

Allchin and Silverberg will continue to report to Paul Maritz, Microsoft's group vice president.

## IBM plans expansion of disk drive operations

► Strong demand prompts \$1.32B investment

By Tim Ouellette

FORTY YEARS after creating the disk drive, IBM is celebrating the voracious user appetite for storage by pumping millions of dollars into its storage manufacturing business.

IBM last week said it would invest \$440 million in a new plant in Thailand and in additional research at the San Jose, Calif., headquarters of its disk drive division.

That brings IBM's total 1996 storage investment to \$1.32 bil-

## **FAST GROWTH**

IBM's investment reflects the explosion in the disk drive industry as a whole, said James Porter, president of Disk/Trend, Inc. in Mountain View, Calif. Some 89.5 million drives shipped last year, including PC laptop and high-end storage systems, and Porter said he expects that number to reach 109.2 million this year.

The Thai plant, which will go online by early 1998, will make drives for portable computers. Laptop makers, including IBM, say demand has been so high that they can't make components fast enough to fill orders [CW, Dec. 2].

Wall Street analysts said IBM's investment will help it keep pace with competitor Seagate Technology, Inc. in Scotts Valley, Calif., in high-end storage disk drives.

IBM last month doubled operations at its Singapore plant, which produces disk drives for large storage subsystems and servers.

IBM officials said the money is also going to improve its OEM business of selling disk drive parts to other disk drive makers, an area contested by Milpitas, Calif.-based Read-Rite Corp.

## **Former NEC CEO** dies at age 89

којі ковачазні, longtime leader of NEC Corp., Japan's largest PC maker, died last week at age 89.

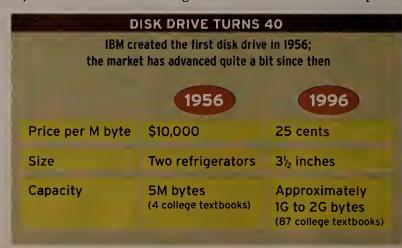
Kobayashi joined NEC in 1929. Since stepping down from the CEO position in 1988, he had been the company's honorary chairman.

Kobayashi joined NEC after graduating from Tokyo Imperial University, now known as the University of Tokyo. He received a doctorate in engineering from the university in 1939.

He became a director at NEC in 1949, executive vice president in 1961, president in 1964 and chairman and CEO in 1976. He also held numerous posts in industrial, professional and government-related organizations.

In the late 1970s, he coined a watchword for NEC — "C and C" — to promote integration of communications and com-

The company plans a memorial service at Zojoji Temple in Tokyo Dec. 24.



TODAY YOUR NETWORK IS A TARGET.



INTRODUCING BULLETPROOF SECURITY.



## Only McAfee Security Suites provide complete protection.

To protect your network these days, you have to protect each *part* of the



are committed by employees.

network—the perimeter, servers, desktops, even network traffic. That's because today's intruders can infect, penetrate, eavesdrop and sabotage nearly any element on

Even your employees are a danger. In fact, according to the 1996 FBI Computer Crime Survey, most network Most computer security breaches security breaches are committed by the very people who -1996 FBI Computer Crime Survey walk past your firewall every day.

## Guards against all network threats. Both outside and inside.

McAfee's unique new security suites provide all the tools you need to fully defend your network. Everything from perimeter and desktop firewalls to anti-virus and encryption.

PC Firewall™ protects desktops against unauthorized access by outsiders and employees. It also denies unauthorized connections to the Internet, thus preventing back-door access to your network.

SecureDesktop combines the industry's best-selling and most effective anti-virus software with two types of industrial-strength encryption. One transparently encrypts all traffic across TCP/IP networks. The other secures files,

e-mail and attachments, even if the receiver doesn't have the same encryption software.

SecureGateway integrates network anti-virus with a perimeter firewall for maximum networkwide protection. Based on McAfee's







McAfee Security Suites protect every part of your network -perimeter, servers, desktops, even network traffic

#1-rated detection engine, the anti-virus automatically scans e-mail, FTP and HTTP file transfers and traps viruses before they can infect the network. And the perimeter firewall bars hackers from gaining access and filters out unwanted Internet activity.

To order or to receive the free McAfee Security CD with actual working software, call 1-800-332-9966 today. We've got you completely covered.



Network Security & Management

Download MCAFEE

ftp:mcofee.com

BBS: (408)988-4004

America Online: MCAFEE

CompuServe: GO MCAFEE

# ©1996 Novell, Inc. All rights reserved. Novell and NetWare are registered trademarks and IntranetWare is a trademark of Novell, Inc.

## E H E

When we created IntranetWare, we designed it to work with your current Novell® network. IntranetWare is merely the next evolution of NetWare®—so you keep the server operating environment you know and love. But you're upgrading it to the most perfect and powerful intranet/Internet solution on the market: with highly advanced file, print, and directory services, the strongest levels of security, the

INTRODUCING INTRANETWARE.

IT EFFORTLESSLY UPGRADES YOUR NETWARE
TO A FULL-SERVICE, INTRANET PLATFORM
WITH INSTANT INTERNET ACCESS.
WHAT ELSE DO YOU WANT?

fastest, full featured web server—and full WAN connectivity to the Internet, supporting all the Internet open standards. So you can look at other, less advanced, solutions that will force you to wreak havoc with your system. Or you can call an old friend. Novell.

Upgrade to IntranetWare now and save over 50% off the new product price. Call 1-800-805-9152.

www.novell.com/intranetware



#### EDITORIAL

# Creepy crawlers As if hackers and surfing employees weren't enough, corporate 'net

cops now have to worry about "software robots" unleashed in cyberspace.

These are smart chunks of code — also known as agents, bots, spiders or crawlers — that scurry about the Internet doing personal and business errands.

Once trained, they can shop, gather research and execute transactions.

There are already several news-filtering agents, and Andersen Consulting has developed BargainFinder,



which shops online for music CDs. Another agent waits at the Federal Express package-tracking site and alerts you when your package has been delivered. Soon we'll schedule appointments by having agents check our calendars.

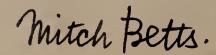
"Let's do lunch. Have your agent call my agent."

But there are some downsides. A typo could lead to the delivery of 200 pizzas with anchovies or an endless loop that crashes Internet servers. Once released, a buggy bot is hard to recall. And when an employee unleashes an agent, your company is liable for whatever mischief it gets into.

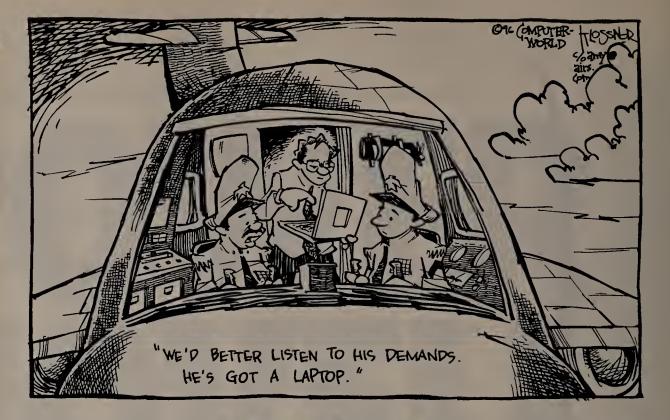
Meanwhile, swarms of agents will be visiting your World Wide Web site, making rapid-fire requests that can overwhelm the server. Worse, what if that mild-mannered visitor is really on a hacking expedition or becomes a double agent?

The early signs aren't good. Hate-mongers in September sent out "cancelbots" to erase 30,000 Usenet messages about gays, Jewish groups, Muslims and feminists. And 'net chat rooms are plagued by bad-bot eruptions from chatterbots, warbots, clonebots, floodbots, annoybots, hackbots, spybots and gossipbots.

Some work is being done on bot ethics (see www.botspot.com), but don't jump on the agent bandwagon until we're sure a world of "good viruses" won't turn bad.



Mitch Betts, associate editor, news Internet: mbetts@cw.com



#### LETTERS

#### Proposed change to code concerns all software users

JUST FINISHED reading senior editor Allan E. Alter's Oct. 28 editorial, "IS wake-up call." I share his view that everyone associated with purchasing, using and managing software ought to be concerned about proposed Article 2B to the Uniform Commercial Code

Even though the Society for Information Management (SIM) represents users and has undertaken a review, it is just one group of volunteers with modest resources. Every major software user group in the U.S. should seek to enlighten its members about this subject now. Software users need to act, and they need to act soon.

Related material can be found by searching "Article 2B" on the Internet. Users can also submit comments in a variety of ways — either at the Web site (the proposed article can be examined at www. lawlib.uh.edu/ucc2b) — or through the SIM's IT Procurement Working Group or the American Bar Association Committee on Software Contracting, both in Chicago.

Robert A. Currie Atlanta

#### Down with techno-twits

o, ARE WE supposed to be impressed that Andrew Seybold plays with his computer toys while driving at 80 mph ["Commuters" computers," Alt.cw, CW, Oct. 21]? How old is this guy, 14?

There are plenty of natural-born morons slaughtering people on our highways; we don't need technology-enabled twits adding to the carnage. I've got a news flash for you, Andy: You're not that important. The world's not going to come to an end if you wait until the next off-ramp to read your E-mail.

> George Dovel Seattle georged@dovel.com

> > There are people

behind those

computers

#### Hats off to our devilish wit

THANK YOU for printing Dave Brown's letter to the editor ["No vulgarity, please," CW, Oct. 21]. It was not only delicious self-parody, but also a thought-provoking tidbit.

I find it hard to believe that anyone who has ever used Unix — or any computer system, for that matter — could be offended

by a headline like "Hell no, Unix won't go."

Aside from the painful truth of that statement, it is a great head-line and a clever reference. It is the imaginary protest cry of a stubborn operating system that dates back to a time when people voiced their objections in the streets instead of via E-mail.

I have come to expect such wit from *Computerworld*. It is a welcome change from computer publications that focus so hard on covering the information industry that they forget there are people behind those computers (and clever ones at that).

> Eric Appleby Cincinnati

#### Buggy betas do a disservice to the software industry

ON MCGUIRE writes in his letter to the editor ["A beta with bugs isn't quite news, you know,"

CW, Nov. 4] that people who expect a polished product when they download a beta version of software do a major disservice to the industry

Earlier this year, Novell released a beta of NetWare 4.11, also known as Green River.

Anyone with a Novell sales representative got a free copy. You could buy a copy for \$30 or attend an update class and get a copy. The license is for 250 users and timebombs Dec. 31.

In this "beta," I've beaten up the network operating system, the

Web server, the IPX/IP gateway and the 32-bit clients and haven't found any bugs yet. I only hope the production release is as stable.

So what do we learn? There are betas and there are betas. Users should demand the best. Perhaps certain software vendors should be viewed as doing a disservice to the industry by releasing software with bugs under any label, beta or production.

Mike Neal Portland, Ore. miken@sba.pdx.edu **More letters,** page 44

Computerworld welcomes comments from its readers. Letters shouldn't exceed 200 words and should be addressed to Maryfran Johnson, Executive Editor, Computerworld, PO Box 9171, 500 Old Connecticut Path, Framingham, Mass. 01701. Fax number: (508) 875-8931; Internet: letters@cw.com. Please include an address and phone number for verification.

#### Start your business rules engine

Patricia B. Seybold

re you still embedding the rules of your business in application logic or database triggers? You're in big trouble. There's no way you can change those systems into flexible applications that meet the rapidly changing needs of your business.

Instead, you should separate the business rules from the rest of your application code. All businesses must be able to change business rules on the fly as they strive to be nimble and competitive. It must be easy for business managers and

even customers to make those changes, without help from programmers.

If you're not tuned in to the concept of business rules, you're not tuned in to your business.

Eavesdrop on al-

most any conversation among business managers, and you'll hear talk about business rules: Why are we refusing credit to Hispanics under 30? What's our policy for educational discounts? Does it apply to private colleges? When does this Separate business rules from applications so your company can be more nimble and competitive

> new pricing plan take effect? Does it supersede prices in effect for existing customers?

Those are the kinds of policies that should be stored in a rules engine, in such a way that they easily can be changed by the business owner.

Business rules previously were associated with niche technologies such as rules-based expert systems and workflow

But the concept of a separate rules engine is on the verge of broader acceptance because of the World Wide Web and the compelling need to integrate disparate applications.

On the Web, companies are beginning to cater to customers' individual preferences with one-to-one marketing and ful-

> fillment. As a customer, I can configure and buy computers at Dell Computer's site, subscribe to a personalized edition of The Wall Street Journal and have Amazon.com notify me whenever a new book is available in my field of inter-

Another way to serve customers is to integrate the applications — from ordering to shipment and billing — that

affect the customer. Business rules should be a key part of that integration.

We need to accommodate the following business rules:

The rules that govern policies, pricing, product configuration and the myriad of "if/then" statements in today's application logic. These should be maintained by the business owners.

- ■The rules in the customer profile. That is where the customer specifies how he wants to do business with your firm.
- ■The rules embedded in your existing systems. Each legacy system has a set of assumptions about what it needs to do its job and what it expects from the applications or users that provide input. Those rules need to be documented as part of the middleware you use to glue applications together. That way, when you substitute one back-end application for another, you'll know what rules need to be changed.

#### **GROWTH IN ACCEPTANCE**

My predictions: Business rules engines will become much more popular in the next few years. And the practice of separating and codifying business rules during the early phases of systems development will become common practice. Business users and customers will begin to take ownership of their rules.

So as you select off-the-shelf applications or development tools, look for the business rules engine. If it isn't included, look elsewhere.

Seybold is president of Patricia Seybold Group in Boston. Her Internet address is pseybold@psgroup.com.

#### Net computers hinge on corporate politics Michael Schrage

he technology behind the network computer is boring. But the politics behind the network computer aren't. Politics, not performance, will determine the success of network computers in enterprise computing.

That's not flip cynicism; that's the way it should be. Honest. If you doubt that, listen carefully to Larry Ellison, Bill Gates, Jim Barksdale and Scott McNealy when they talk about network computers vs. PCs. When you get past the selfserving sound bites, what you hear is the lusty roar of corporate politics.

Don't be mislead by political analysis that masquerades as economic analysis. Yes, the market researchers are right when they calculate the life-cycle costs of the corporate PC as being an order of magnitude greater than the price of the box and its associated software. In fact, I wouldn't be surprised if some organizations, such as investment banks and insurance companies, discover that their PCs generate soft-dollar costs more than 50 times greater than the hard-dollar

Indeed, if there's one unambiguous positive effect from today's network computer vaporware hype, it's that companies are being forced to account for softdollar budgets when they shell out hard dollars for hardware. It's about time.

But is there a medium in an organization more political than a spreadsheet? Is there any act more riven with conflicting assumptions and priorities than preparing a budget?

Why, yes, there is. Information access is every bit as political and politicizing as reasonably, they

preparing a budget. The budget process can be as much about information access as resource allocation - just as information access can be about budgets.

That's why the argument

that network computers represent a less expensive, better alternative to PCs represents a simplistic misreading of what really matters in companies today. The real issue isn't the cost or functionality of PCs or network computers. The hotbutton issue is the politics of the organization. Who controls access to missioncritical data? Do managers get rewarded for sharing information or hoarding it? Who should get access to what information at what time and at what cost?

IS managers who think the arrival of \$999 network computers that can run Navigator and Java will make answer-

ing those questions any easier would well-advised to accept their early retirement ofshould



The politics of information will decide the fate of network computers having direct contact with anybody out-

The network computer is an artifact not of technological innovation, but of corporate infighting. There's a market for machines that give the enterprise greater control over information access and analysis for less money. So what happens when some managers get PCs and others get network computers? You know perfectly well what happens.

A quickie history lesson: What happened when the enterprise bought PCs for some departments and not for others? People bootlegged PCs.

That's what will happen in a world of intranets and network computers, depending on the infopolitics of the enterprise. So let's have the integrity to admit that the network computer isn't about the economics of information, but the political economy of organizations. Information access - not information technology budgets - will be the minefield that either keeps network computers out of the enterprise or brings them in.

Schrage is a research associate at the MIT Media Lab and author of No More Teams! His Internet address is schrage@media.

# Harness the Power of your Distributed Environment





#### PATROL

The true potential of your distributed environment is right there, waiting to be harnessed. The PATROL® Management Suite of products gives *you* the power. PATROL helps you better support your end users by ensuring their critical applications and data are available – 24 hours a day, 365 days a year.

**PATROL** proactively monitors a wide range of availability and performance indicators for each managed software solution, discovering errors and correcting problems — when authorized — before end users are affected. Supporting higher availability and performance for more leading applications, databases, middleware, Internet servers, and resources than any other management product. So your end users remain productive.



**PATROL** management support is available today for more than 30 leading software solutions, including SAP R/3, PeopleSoft, Oracle, Sybase, Informix, TUXEDO, Lotus Notes, Internet servers, and your in-house applications. Scaling efficiently across thousands of servers running Unix, NT, OS/2 or MVS. And integrating seamlessly with your existing system and network management frameworks, including HP OpenView.

PATROL technology is being used on tens of thousands of servers around the world. PATROL is the only application and data management product shipped with every Digital AlphaServer worldwide, and PATROL will be the only management product embedded on Intel's new i960 processor. No wonder leading analysts and consultants are calling PATROL the "clear choice" for managing applications and data across distributed systems.

### BIMCS

For a copy of the most recent analyst reports and other information, CALL 800 841-2031 or 713 918-8800 or visit us on the Web at: www.bmc.com/patrol Harness the Power-Today!

The Society for Information Management (SIM) and **COMPUTERWORLD** present:



May 19 - 21, 1997 The Pointe Hilton Resort at Squaw Peak Phoenix, Arizona

#### A Dynamic Forum Where IT Executives Get Answers On:

- Distributed Computing
- Data Mining and Data Warehousing
- Doing Business with Internet **Technologies**

#### **Technology Panels**

The following three, 60-minute case-study panels discuss technology applications and implementation, including performance expectations, scope, process and return



#### Distributed Computing Monday, May 19, 1997 Moderated by: Alan Alper Editor, Magazines Group Computerworld

The effective use of distributed computing technology raises new challenges for the IT executive. The following issues will be discussed to help you separate promises from reality and to effectively estimate the impact on your resources:

- migration of existing systems
- · increased need for object-oriented development
- systems management procedures
- user file management and related fundamental
- adequate hardware and software componentry
- language standards and interoperability

#### The 1997 Executive Technology Summit Harvesting Your IT Investments

As we approach the year 2000, business is being irrevocably changed. Whole industries are being reshaped by the forces of increased customer expectations and dramatically shortened time to market cycles. This raises the question, "How can I increase my yield from my IT investments?"

The fourth annual Executive Technology Summit is being presented by SIM and Computerworld, to offer attendees more insight into the ever changing world of information technology. This unique program includes: keynote presentations, where IT visionaries offer first-hand accounts of technology solutions; technology panels, where CIOs are queried by highly respected industry analysts, consultants and editors; technology provider strategy panels, offering perspectives from sponsoring companies' CEOs or CTOs; and Solution Labs, where leading suppliers share their IT expertise.

#### **Powerful Keynote Sessions**









Kicking off ETS '97 is John Cross, General Manager of IT for British Petroleum PLC. Cross discusses the "Transformation of the IT Function at British Petroleum" as they moved from a mainframe VMS environment to client/server. A special Integrator keynote has been added to the program this year, featuring John Singel, National Internet Technology Domain Leader of Price Warehouse. The closing keynote is provided by Naomi Seligman, Senior Partner of the Research Board, who covers some of the data collected by her exclusive organization.

#### **Technology Provider Strategy Panels**

Here is your chance to hear from a senior level IT executive from an ETS sponsor company in a moderated panel format. Corporate strategies and future directions are revealed, as well as answers to questions about new technologies and emerging trends. Hear their stories and learn what you need to know about these companies in order to make beneficial IT investments.

#### **Solution Labs**

See for yourself, the latest technology solutions from today's top IT vendors. Leading suppliers share their vision and expertise. In these small, highly interactive educational forums, explore specific solutions to the issues facing you and your organization.



#### Data Mining and Data Warehousing

Tuesday, May 20, 1997 Moderated by: Alan Paller Director, Research and Education Data Warehousing Institute

Many issues plague the IT executive attempting to implement a successful data warehousing or data solution for their enterprise. Here's your opportunity to get the answers to the following questions:

- what kind of infrastructure is necessary to support the amount of data that will be stored and processed?
- do I need a relational database or multi-dimensional database?
- what set of tools will most appropriately support end-user needs?
- what are the real capabilities, the relative costs and the
- should analysis happen on the desktop or on the server and who has what level of access?
- search engine, text retrieval engine and sort processesing options



#### Doing Business with **Internet Technologies**

Wednesday, May 21, 1997 Moderated by: Gay Slesinger Vice President, Giga Information Group

What are the viable solutions, the costs and the expected return from the corporate business perspective when doing business with Internet technologies? This is your opportunity to discuss solutions on:

- · choice of architecture
- security and standards issues
- capitalization of the Internet for intranet purposes
- infrastructure support issues
- planning for effective use of the Internet beyond the year 2000



And again, this year's ETS conference will be hosted by our Master of Ceremonies, Scott Shuster, Founding Editorial Director, Business Week Conference Programs.

For more information or to register for ETS '97, call 1-800-464-0061 today! Or visit our website at www.computerworld.com or SIM's website at www.simnet.org.

Come meet and visit with the following ETS '97 Sponsors:



!Candle



Data **MIND** 











COMPUTERWORLD

and

Acer (

present the

1997 Riek

Tennant Cartoon Calendar

SEE INSIDE FOR DETAILS
ON MONTHLY ACER
OPRODUCT GIVEAWAYS!

COMPUTERWORLD







EVERYONE today is advertising the future. But do they have the tools to get you there?

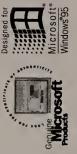
DVDs, high-definition wide-screen monitors, Internet ond intronet servers.

If people ore tolking about it, we're probobly olreody working on it.





1-800-551-ACER www.acer.com/aac/





"SOMEONE KEEPS GOING INTO MY PERSONAL FILE. TO SURE AS HECK LIKE TO FIND OUT WHO USES THE PASSWORD "PEANUT BREATH."

### December 1996

in with				1	
da da		10 mg			
Saturday	w	7:	21	00	. 13
62	4-1-1	pers '	2	78	100
2 >		A . [1		# 6	7 77
Friday	E . E	m.	20	27	- 9
1 37	, f. 60	Para Mila	2	7	101 F
day	應	j * '			*
Thursday		2	6	9	4 7
=	<b>10</b>		-	26	
ednesday	4 KT		24 17		المي ال
E S	1, 5,	_	00	10	
Wed	4	-	-	25	
A	· · · · · · · · · · · · · · · · · · ·		-		Alexander 1
Tuesday	. + 1	-		_	
P Z	C.	= 1	7	24	5
. = "	Part :	11 3	7.		- Harrison II
Monday		4.	1		* 1
ž	7	0	91	23	30
	-	*****	-+		<del></del>
eg A	1 for	W. Fr	74	1/4.	
Sunday	-	00	5	22	53
200		m . El	-	أنينتهية	
	4 1	京 光		1 10	

### February 1997

	The state of the s			-	7 3-
Saturday	· · ·	ထိ	15	.22	**
Friday		7	7	21 *	28
Thursday	74	9	<u> </u>	20	27
Monday Tuesday Wednesday Thursday		Ş.	12	10	26
Tuesday		4		∞ .	25
Monday	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	n	2	17	24
ak.	, A:		5	مريد	

WIN An AcerNote Light Multimedia Notebook in our January giveaway.

AcerNo 120M

AcerNote" Light Multimedia Notebook

120MHz Intel<sup>®</sup> Pentium<sup>®</sup> processor 16MB EDO RAM 11.3" dual scan display Built-in 6x CD-ROM



Enter at www.acer.com/aac/

Saturday	1.1	<b>©</b>	25	
Friday	en 2		24	<b>~</b>
Thursday	6	9	<b>E</b>	30
Wednesday Th	New Year's Day	<u> </u>	22	29
Tuesday Wed	No.	4	7	28
	nd Ronaid ad into gazine's Fame.		g, Jr. Day	
Monday	Acer's Stan Shih and Ronald Chwang inducted into Dealerscope Magazine's Industry Hall of Fame.	<b>~</b>	.20 Martin Luther King, Jr. Day	77
Sunday	Acer Milestones 1976 Acer*(Multitech) is founded.	<b>12</b> ,	6.	26

# January



### January 1997

-	100	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 4,12.	1 1 1	CAR
Safurday	£4.	1 3	V.	明 并	F F "
l ē		-	00	25	
S	4	=	9	2	4.
	W. 17.	1-4-1-			24
1	100	. with	Carl Carl	10 11 15 1	-
45	11 1/2 11	1			100
-	00	9	2	2	33
4.			1	24	
1	riche P	1 80	100		100
PS SE	1 . P.	A Think			
1	1 学 1	12. 13	9	en	30
Wednesday Thursday Friday	<b>M</b>	1.00	91	23	60
1 2		the same	1-1/2		130 10
1	18,	Pr.	1 6		F . 101
2	ALC: NO.	一点 一般	31 1	11	29
1 5		00	**	200	2
13	-		4 15	. 22	2
-	The work of	1945 F. F.	The second	. P. 7 =	18 18 4
끷	1 m	100		AND WITH	1 3 1
. 2	\$ 4 -	1	4	-	00
Monday Tuesday		1 3	14 15	7	28
1	N 45 73 8	1 2 2	a division of	12 to 1 and 15.	-
1		1	if white	4	18 7.57
1 5	A 一种 生	150	60	6 SHI	A 5
W E	1d - 1	9	<u></u>	20	27.
1 16	سنتوسد	-			
12		18	1996 1	11万满土	100
Sunday	4	1.41	148.00	4.5 4	W
1		10	2	5	56
the stay		7		100	-41
1/2	\$ 17	" " " There's	n		Feb. 14

### March 1997

		- 2		- I		
2	444			F 15		1
뀰		p 1	黄	want.		
Saturday	9	į .	" 3 m	2	22	29
့်အ	3 . #	-, -	00	- S	· CN	N
			-	- marine	1-	
		The same of	S. S	1 160	-31	21 3.
2				40 100	1	343
Ē	機能で		4	4	-	00
				8 2	21	78
		1.00		- A 17		3/2/
e e		- 1900	1	""	100	W :
22	8.			00	0	141
Ē	er 6.		9	13 14	20	27
-		18		Circuit	24	
Monday Tuesday Wednesday Thursday Friday		3	# C	10 10	X 14	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
- 8	15		S	12	1 1 1	
틍	ight.		100	CH	0.9	26
윤	1 Tag					2
		-	The said	Ye.	61	Annah consult
3	2/2				A361	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1.25				F %	-	
Ž			-		20	2
· .	1			=	17 18	22
. =				5 L M	. 8	-
- 뀰						· m
-			1.8	0	-	4
			43	· · · · · · · · · · · · · · · · · · ·	14	64
	3.0	Marine .		19/19	7.7.7	
-		1	11 14		170	0
Sunday	197. C				100	20
SE		in the	2	6		2
			1		16	23 24 31
			to go in	F		

WIN An AcerPower Desktop in our February giveaway.

Enter at www.acer.com/aac/



Acer Power Desktop

133MHz Intel Pentium processor 16MB EDO RAM High-performance 1.2GB HDD Microsoft\* Windows\* 95



Friday	ą	7	14	21
Thursday		9	13	20
Wednesday		5	12 Ash Wednesday Lincoin's Birthday	61
Tuesday		<b>4</b>		<b>©</b>
Monday	Acer Milestones 1994 Acer introduces black multimedia PC for the home.	<b>3</b>	10.	17 Washington-Lincoln Day
Sunday	Acer Milectones 1994 Acer is the first computer manufacturer to ship Pentium® processor-based desktops in the U.S. retail channel.	2	, <b>6</b>	7. <b>91</b>

Saturday



Washington's Birthday

22



23

LECTS AN ACTUAL OFFICE ENVIRONMENT. IT MULTI-TASKS WITH OTHER USERS, INTEGRATES SHARED DATA, AND THEN USES THAT INFORMATION TO NETWORK VICIOUS RUMORS THROUGH AN INTER-OFFICE LINK-UP,"

### February 1997

Saturday	id and	00	5	22		
Friday	el .	· rott	1 15	21, 2	113	-
Thursday F	- 44 14	7	13 14	20 2	27 28	
Wednesday Thursday	The state of the s	# 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	12	19 2	26 - 2	
onday Tuesday 1	7:1	4		<u>∞</u>	25	1
Monday	· · · · · · · · · · · · · · · · · · ·	m	0	1	24	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Sunday	* 18.4	2 m	0	. 91	23	2 2 3 3
, ii	de i	Note the	-	4 ' A	4,00	, d , v

### April 1997

Saturday	, ,	12	0	26	1
Friday	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	g. 2008	<b>**</b>	25 2	A Au
hursday -	7	0	***	. 10	
dnesday T		£ .	· \$112	3 24	
Tuesday We	, A	6	5	22 2.	3
Monday To		90	B (4)	2	29
onday M	3.	1 6	7 4	22	78
S.	1	0		2	27

WIN An AcerAltos 900Pro Server in our March giveaway.

Enter at www.acer.com/aac/



AcerAltos" 900Pro Server

180MHz Intel Pentium processor 32MB ECC RAM, 256KB Cache 2GB SCSI hard drive and 8x CD-ROM The powerful, entry-level solution



Saturday	-	∞	<b>51</b>	22	29
Friday		1	14	21	28 Good Friday
hursday		9	<b></b>	20	27
Wednesday		•	12	19	26
luesday		4		<b>∞</b>	25
Monday	Acer Milestones 1996. The Acer Aspire" Teceives PC Magazine's "Editor's Choice Award".	8	10	17 St. Petrick's Day	31
Sunday	Acer Milestones 1994 Acer introduces the first 90MHz Pentium® processor-based server.	2	6	91	Palm 23 Sunday 23 Easter 30 Sunday

March



"YOU'D BETTER GET OUT HERE-ONE OF THE LINKS IN THE NETWORK IS STARTING TO ACT UP."

### March 1997

·			amortina de	garages about	بتقميت بيرا
Saturday	Act Services	ထ	.15	22	29
Friday		7	14	21	28
Thursday	15 m	9.	<u> </u>	20	27
Wednesday	* (3.7)	10	12,	67	. 79
Tuesday		4		<u>∞</u>	25
Monday	The second secon	က	0	17.0	24
Sunday	, and	2	1 10 6	16	23
	3 5				

#### May 1997

A					
Saturday	, (m)	2	17	.24	31
Friday	2	6	16	23	30
Thursday		00	15	22	29
Tuesday Wednesday Thursday	# 1 3 # 12 3	7	7	21	28
Toesday	p A	9	<u></u>	20	27
Monday		<b>~</b>	12	10	26
Sunday	*	4	=	38	25
	30	The second			

WIN An AcerNote Nuovo Notebook in our April giveaway.



AcerNote Nuovo" Multimedia Notebook

Up to 7-hour battery life 133MHz Intel Pentium processor 11.3" dual scan color display 28.8KBps modem with fax



Enter at www.acer.com/aac/

Professional Secretaries Day

Passover

Passover begins at sundown

30

29

28

27





"HOW SHOULD I KNON WHY THEY TOOK IT OFF THE LIST? MAYBE THERE JUST WEREN'T ENOUGH MEMBERS TO SUPPORT AN 'AIREDALES FOR EIVIS' BULLETIN BOARD,"

### April 1997

day         Wonday         Tuesday         Wednesday         Friday           7         8         9         10         11           14         15         16         17         18           21         22         23         24         25           28         29         30         30         30	Saturday	5	19	.26	***
Monday Tuesday Wednesday  7 8 9 14 15 16 21 22 23 28 29 30	Frida	4		25	13
7 8 7 8 14 15 21 22 28 29	Thursday	2	17	24	1,2%
14 7 7 21 21 28 28	Wednesday	7	16	23	
2 2 2	Tuesday	- 00	15	22	29
The state of the s	Monday	7	<b>4</b> 5 3 8 3 6 3 6 5 6 5 6 5 6 5 6 5 6 5 6 5 6 5 6	21	28
Sum Sum 27 20 27 27	Sunday	9	3	20	27

### June ,1997

Saturday	14	21	78 78 78	
Friday	2	20	2 2	
(Thursday .	12 1	19 % 2	26 2	
Wednesday	+ E	<u>∞</u>	23	2 ×
Tuesday 2	, 02	12	24	***
Monday	6	92	23	30
Sunday		5	22,3	29

# WIN An AcerPower Minitower in our May giveaway.

Enter at www.acer.com/aac/



AcerPower Minitower

133MHz Intel Pentium processor High-performance 1.6GB HDD Microsoft Windows 95 16MB EDO RAM





3	10	17	Armed Forces Day	24	31	
2	6	. 16		23	30	Memorial Day
-	••			22	29	
. but	7	14	*	21		
	<b>9</b>	. <b>E</b>	\$ \$	20	. 27	
Acer Milestones 1993 Acer America is the first to ship EnergyStar-Compliant.	<b>10</b>	12		19 Vimorio Day (Canada)	26	Memorial Day (Observed)
Acer Milestones 1989 Acer acquires Altos Computer Systems, the leading manufacturer of server solutions.	4		Mother's Day	<b>00</b> ,	25	4

Saturday

Friday

Tuesday Wednesday Thursday

Monday

Sunday





"I WISH SOMEONE WOULD EXPLAIN TO PROFESSOR JONES THAT YOU DON'T NEED A WHIP AND A LEATHER JACKET TO FIND A LOST FILE."

### May 1997

Saturday	<b>CO</b>	2	17	24	31
Fritany	7	6	91	23	30
Thursday		90		22	50
Wednesday Thursday	1,3	1	14	21	28
ruesday W	The state of the s	9	* 21.	20	400
Monday Tuesday		- 1	1	4	26 2
Sunday	2.04	# W W	yes let	× .	7
		The state of the s	1		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

#### July 1997

The state of the s	
5 Saturday 5 12 19	
· 1 音 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	71
1 = 4 4 1	. !
	- 1
1 5 40	. No.
5 Satur 5 26 26	200
A STATE OF THE PARTY OF THE PAR	
Fritay S	
	19-44
E 4 = 8 2	
the state of the s	
7.2 . 818 1 61	
	-15
	1
3 10 10 33 31 24 24 31 31 31 31 31 31 31 31 31 31 31 31 31	7 .
A STATE OF THE STA	
1 4 . 1 . 1 . 1 . 1 . 1 . 1 . 1 . 1 . 1	No.
1 8 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1
し置く こうきょしょう インター	5.
Wedne 9 9 23 23 30	2. 4.
30 22 30	7 1
Monday Tuesday Wednesday Thursday  7 8 9 10 14 15 16 17 11 22 23 24 8 29 30 31	18.
1 四 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	125
The state of the s	26
1 8 8 22 22 29 29	4
	. ]
1 2 2 2	# 2
8 8 8 15 15 22 29 29	
	2 6
and the second of the second o	
Z 4 9 2 4 7 1 - 9 00	\$ 3
21 21 28 28 28 28 28 28 28 28 28 28 28 28 28	a Ju
and the standard of the standa	
1 1	المتعا
F 10 . 1 - 10 10 10 10 10 10 10 10 10 10 10 10 10	1 /
Ballerine (1)	90
	1
Sunday (00 / 7	1 2 2
27 20 27	10
27 20 13	

WIN An AcerAltos 9000 Server in our June giveaway.

Enter at www.acer.com/aac/



AcerAltos 9000 Server

166MHz Intel Pentium processor 32MB RAM 2GB hard drive and 8x CD-ROM The ideal mid-range solution



Saturday	7	14.	21	28	Acer Milestones 1996 Acer celebrates its 20th anniversery.
Friday	9	<b>~</b>	20	27	Acer Milestones 1996 The Acer Aspire receives Business Week's "Best Product Design of the Year" award.
Thursday	5	17	6	26	Acer Milestones 1991 Acer introduces ChipUp, the world's first 386-to-486 single-chip CPU upgrade.
Wednesday	4			25	
Tuesday	<b>8</b>	2	The second secon	24	
Monday	2	6	92	23	30
Sunday	. , , , , . , . , . , . , . , . , . , .	<b>60</b>	15	22	29





### June 1997

Saturday 7	14	-21	28	
Friday 6	13	20	27	
Thursday 5	12	19	26	6
Wednesday	=	18	25	
Tuesday 3	2	17	24	
Monday T	6	16 4	23	30
Sunday	<b>8</b>	15	22	29
3 × 17. 31. 32.	Service Service	. · .		

### August 199

Friday Saturday	2	6	92	23	30
Friday	1				
		<b>~</b>	5	22	29
Thursday		7	7	21	.78
Wednesday Thursday .	ئىسىدىنىڭ ھۇرى قۇرى ئىمال	9	5	20	27
Tuesday	Fr A	5	12	19.3	26
Monday	(1)	424	<b>—</b>	00	25
Sunday		m	2	17.5	2431

WIN An AcerPower Business Multimedia Desktop in our July giveaway.

Enter at www.acer.com/aac/



AcerPower Business Multimedia Desktop

133MHz Intel Pentium processor 16MB EDO RAM High-performance 1.6GB hard drive 8x CD-ROM, sound card and speakers



Saturday	5	12	, <b>61</b>	26	
Friday	4 Independence Day	ege de la companya de	<b>2</b>	25	
Thursday	e.	01	4	24	31
Wednesday	2	6	91	23	30
Tuesday	T Canada Day (Cenada)	<b>~</b>	2	22	29
Monday	Acer Milestones 1996. Acer ranks #4 in PC server shipments worldwide (IDC).		7	21	28
Sunday	Acer Milestones 1986 Acer opens a U.S. office in San Jose, CA.	9	· <u>e</u>	20	27





"Awww jeez-I was afraid of this. Some poor kid, bored, with the Usual chat lines, starts boking for bigger kicks. Pretty soon they're surfin, the seedy back alleys of cyberspace, and before you know, they're into a file they can't 'undo'. I gress that's why they call it the Web. Somebody open a window!

#### July 1997

Saturday	2	12	19	.26	÷.
Friday	4	*8*	<u></u>	25.	
Thursday	" ," ເກິ	01	17	24	31
Wednesday	7	6	.16	23	30
londay Tuesday	1.	∞ ,	15	22	29
Monday	A P 21	7	1 14 15 15 15 15 15 15 15 15 15 15 15 15 15	21	28
Sunday	No.	9	13%	20	27

### September 1997

			1 100		
Saturday	5 (4)		2 4 5		1
Satu	0	2	20	11	Appropries
° ₹	AL =	1.7		a	#1
Friday	2	7	19	26	ĝu.
) Again		}	2 R	*+	3 Wa
Thursday	4	= 1	<u>∞</u>	25	4 2
A C	3 8	- 0	47	4-9 y a 4	
Wednesday	5	2	17	77	
,		-6			*
Tuesday		300	9	23	30
	1			7-6	<u> </u>
Monday	- 3	1	5	2	. 6
E .	- 0	0	A	7	29
unday		19		-264	
<u>8</u>	mad F		14	7	78
1 1/10	7. 5. 18				100

WIN An AcerNote Light Multimedia Notebook in our August giveaway.

AcerNote

AcerNote Light Multimedia Notebook

120MHz Intel Pentium processor 16MB EDO RAM 11.3" dual scan display Built-in 6x CD-ROM



Enter at www.acer.com/aac/

$\overline{}$					
Saturday	,	6	16	23	30
Friday	<b>,</b>	€	15	22	29
I hursday		7	<b>14</b>	21	<b>78</b>
Wednesday	T T	9	<u>~</u>	20	27
luesday	Acer Milestones 1994 AcerAltos 7000 earns "Editor's Choice" from Computer Reseller News.	<b>\</b>	12	61	26
Monday	Acer Milestones 1994 AcerPower Pentium* Multimedia rated "Top-of-the-Line Multimedia System" by Personal Computing.	***	y	<b>8</b>	25
Sunday	Acer Milestones 1991 AcerFrame is first multiprocessor system using Intel® 486/50 with 64-bit bus.	က	01	1	24

# August



"Of course graphics are important to your project, Eddy, but I think it would've been better to scan a picture of your worm collection."

### August 1997

Saturday		6	16	23	30
Friday	نستي دد د د		15	22	29
Thursday	9	1	14	.21	28
Monday Tuesday Wednesday Thursday		9	13	20	27
Tuesday	* (# # - ***)	2	12	61	26
Monday	1 54 1 54 1 5	4	4.5	00 date	25
Sunday	4	m	° '	17	2431
with a					

### October 1997

Saturday	4	=	00	25	
Friday	<del>्रं</del> जू	2	1	24	2
Thursday	2	0	*16.	23	30
Monday Tuesday Wednesday Thursday	1 M	00	15	22	29
Tuesday	state of	7	14	21:	28
Monday	4 8	9	2	20	27
Sunday	frage and	3.		19	26

WIN An AcerPower Desktop in our September giveaway.

THE COLUMN TO TH

AcerPower Desktop

133MHz Intel Pentium processor 16MB EDO RAM High performance 1.2GB HDD Microsoft Windows 95



Enter at www.acer.com/aac/

Saturday	9	<b></b>	20	27	Acer Milestones 1995 Acer America introduces revolutionary Acer Aspire desktops and minitowers for the home market.
Friday	2	71	61	26	Acer Milestones 1995 Acer's Stan Shih is "International CEO of the Year" (Financial World).
Thursday	4		<b>∞</b>	25	Acer Milestones 1992 Acer offers first symmetric multiprocessing version of TCP/IP.
Wednesday	<b>C7</b>	01		24	
Tuesday	2	6	9	23	30
Monday	Labor Day		<b>5</b>	22	29
Sunday			7	21	28





THIS WAS WORSE THAN WOODSTOCK-PEOPLE PASSED OUT ON BAD APPS, AND A BUNCH OF ANALYSTS PUSHED OVER AN ESPRESSO MACHINE SCREAMING, 'LATTE TO THE PEOPLE!"

### September 1997

Saturday 6	2	20	.27	
Friday 5	12	19	26	*
Thursday 4.		<u>∞</u>	25	8'
Wednesday	10	17	24	* 1
Tuesday 2	6	91	23	8
Monday	00	15	77	2
Sunday	12.00	14	17	07
1 de 1	i ganga	. 3	-	5 34.4

### November 1997

F					
Saturday	٠,		,		5
1 2	13 "	-	MY "	7	6
S	Burn Bright	00	-	22	29
2 =	100	y 100	11		1
Monday Tuesday Wednesday Thursday Friday	di 18	T 1	-	- 4	60 %
. 4		1	14	21	28
ay	. 1				1 7 12
ITS I	y 1		3 AC3	_ ~ ]	
를.	Eq.	9	=	20	27
a.	-	2 3 1		30	
25	a " day		F. 1	1	
- E	1 1	2	2	6	26
-	#	-	7		7
day	The state of				- 1
Res		Willen 1.	<u>一</u> 图	00	25
-	. 4	7		,	C1,
day			1 200		120 1
9		19.1		2001.	
7		المردد	- 4.		7 8
_		The state of	A lab		-
Sunday	. 小樓	17 25	3	· 1	8
3	و الما الما	Y .	N 19 3	0	25 4
	E TELL	4 3 P	473		3
100				-	

WIN An AcerNote Nuovo Notebook in our October giveaway.

AcerNote Nuovo Multimedia Notebook

Up to 7-hour battery life 133MHz Intel Pentium processor 11.3" dual scan color display 28.8KBps modem with fax



Enter at www.acer.com/aac/

Thursday
Wednesday
Tuesday
Monday
Sunday

Saturday

Friday

4	11 Yom Kippur	18	25	5	
<b>က</b>	10  Yom Kippur begins at sundown	17	24	United Nations Day	<b>5 I</b>
2 Rosh Hashanah	6	16	23		50 
Rosh Hashanah begins at sundown	••	2	22		<b>67</b>
	7	<b>71</b>	21		70
Acer Milestones 1996. Acer ships the AcerNote <sup>IM</sup> Nuovo <sup>IM</sup> , the notebook with 7 hour battery life.	9	, E	Columbus Day (Observed) Thanksgiving Day (Canada)		7.
Acer Milestones 1989 Acer ships its one millionth PC.	ĬĄ.	12	Columbus Day		ZO Daylight Savings Time ends





### October 1997

Saturday	4	=	<u>∞</u>	25	
Friday	<b>(1)</b>	2	-17	24	31
Thursday	2,	6	91	23	30
nesday	***	<b>∞</b>	5	22	29
Tonday Tuesday Wed	į.	<b>1</b>	14	21	28
Monday	* # E	9	<u>.</u>	20	27
Sunday	F18	\$	12,	61	26
	#	F. Fryers			: 6

### December 1997

Saturday	9	<u>ದ</u> ್ದ	20	27	y the
Friday	·	12 xx	19	26	
Thursday			φ ( ) Φ ( )	25	3 3 3 3 3 4
Wednesday Thursday	~		1	24	<del>, , , , , , , , , , , , , , , , , , , </del>
Tuesday	7 7	0	. 91	23	.30 02
Monday		<b>x</b>	1.27	· ya	67
Sunday		2, 14	4	4	27
-	ed on f	1 14	<u></u>		- 1

WIN An AcerPower Minitower in our November giveaway.

Enter at www.acer.com/aac/



AcerPower Minitower

133MHz Intel Pentium processor High-performance 1.6GB HDD Microsoft Windows 95 16MB EDO RAM





Saturday	_	•••	15	22	29
Friday		, ,	41	21	28
Thursday		9	<b>9</b>	20	27 Thanksgiving Ďay
Wednesday		5	71	6	<b>26</b>
Tuesday	Acer Milectones 1994 Acer revenues top \$5 billion.	4 Election Day	Veterans Day Remembrance Day (Canada)	00	25
Monday	Acer Milestones 1994 Acer is first ISO-9000 certified PC company.	<b>co</b>	10 Veterans Day (Observed)	11	24
Sunday	Acer Milestones 1992 Acer creates world's first 386SX-33 chip set.	2		<b>91</b>	23

# November



"I don't care if you do have a coalition of kids from 19 countries backing you up; I'm still not buying you an ISDN line."

### November 1997

3 4 5 6 7 10 11 12 13 14 17 18 19 20 21 30 24 25 26 27 28	Safurday		00	15	22	29
Monday Tuesday Wednesday Thursday 3 4 5 6 10 11 12 13 17 18 19 20 24 25 26 27	Friday		7	Ry ST		28
Monday Tuesday Wedners 3 4 5 10 11 12 17 18 19 24 25 26	Thursday	4 2 3	9	\$6 E		4
Monday 3 3 3 10 117 17 24	Wedne	a to the	2	12	13	1. A. S.
1	Tuesday	1995 C	4	= 5		3
30 s	Monday	The second	m	2 1	7	47
2 6 - 2	Sunday	A 400	2.	4	25	200

### January 1998

1				W.	
Saturday	y + "	0	12		1
	* es	90	2	24	3
Friday	Att.	KAK.	9		30
10	~~	0		23	8
Thursday	Wa-		5		
	-	90		22	29
Wednesday	i A.	\$ 1 m			
We .	6 1 E	1	7	71	28
Tuesday	W	-	- 3		3
į į	1230	9	E .	20	27
unday					- 4.
量 李		5	7.2	6	28
нау	1 A		العباق م	1000	: 1
200	tuned \$	4		2	2
4 1		F 100 11	mark to	a.	-

WIN An AcerPower Business Multimedia Desktop in our December giveaway.

Enter at www.acer.com/aac/



AcerPower Business Multimedia Desktop

133MHz Intel Pentium processor 16MB EDO RAM High-performance 1.6GB hard drive 8x CD-ROM, sound card and speakers



S		
Friday	5	26  Boxing Day (Canada)
Thursday	11	25. Christmas Day
Wednesday	9	24 Hanukah
Tuesday	6	23 Hanukah begins at sundown
Monday	<b>-</b>	22
Sunday	7.	21

20

2

Saturday

December

1995 Acer ranked 7th largest PC brand in the world by IDC.

1992 Acer tops \$1 billion in revenues.

Acer Milestones...

Acer Milestones...

30

28

27

COMPUTERWORLD TO SERVICE TO SERVI



IN an industry where companies rise and fall overnight, it's nice to know there's one with something behind it.



Specifications and product line availability subject to change without notice. Acer logo are registered trademarks and AcerAltos, AcerNote, Nuovo and AcerPower are trademarks of Acer America Corporation or Acer Inc. Intel and Pentium are registered trademarks of Intel Corporation. Microsoft Windows and Windows logo are registered trademarks of Microsoft Corporation.

## Acer Computer Sweepstakes - Official Rules:

4.To Enter: No purchase necessary to enter the Sweepstakes and no sales presentation is required. You may enter into the drawing for a particular month by completing the entry form provided on the Acer America website at www.acer.com/acc/ as set forth for each month in the 1997 Acer Calendar. The website will receive entries starting the lirst business day of the calendar month and ending the last business day of that calendar month. You may enter into the drawing only once in each calendar month, and such entry will only enter you for that calendar month in which you enter. You may also enter by handprinting your name, address, telephone number and the words. "Acer Computer Sweepstakes, 2641 Orchard Pat Exercises, 2641

Step 1: Multiply 1996 times 501. Step 2: Add 6,843,221 from the answer to Step 1. Step 3: Subtract 3,462,986 from the answer to Step 2. Step 4: Divide the answer from Step 3 by 3.

Non-compliance with the time limitations contained herein or return of any prize/prize notification as undeliverable will result in disqualification and an alternative winner being selected by a random drawing. Winner shall sign a release of liability/affidavit of eligibility prize acceptance within 30 days of receipt or forfielt prize. By acceptance of prize, winner agrees to the use of his/her name and/or likeness for the purposes of advertising, trade or promotion without further compensation (Tennessee residents excepted), unless prohibited by law. Nether Acer nor its respective affiliates, subsidiaries, divisions or related companies is responsible for any damages, taxes or expenses that the winner might incur as a result of this contest or receipt of prize. 4.Winners List. For a list of the winners, visit the Acer website or send a stamped, self-addressed envelope to Acer Computer Sweepstakes Winners List. Channel Marketing Department, 2641 Orchard Parkway, San Jose, CA 95134. S. Restrictions: Void where restricted or prohibited by law. All federal, provincial, state and/or local regulations apply. Acer reserves the right to cancel this promotion at any time with appropriate notice. Sweepstakes is sponsored by Acer America.

#### Channel-surfing with PCs

DAVID MOSCHELLA

HE INFORMATION superhighway was the dominant Internet metaphor of 1994 and 1995. The digerati now buzz about the parallels between the PC and the TV. "Channels" is the hottest word today on the Web.

I'm not talking about distribution channels or even the important interactive television efforts from companies such as WebTV Networks and Wink Communications. As last month's Comdex made clear, our industry is really excited about the idea of turning a typical PC into a 24-hour narrowcast receiver.

Start-ups such as PointCast, BackWeb Technologies, Marimba, Intermind and AirMedia have pioneered the field. In the next year, they will be joined by Netscape's Constellation and Microsoft's Active Desktop. The approaches vary, but they share the following common themes:

- Like a fax machine, the PC should work all the time, not just when a human operates it. AirMedia even delivers data to mobile PCs through a radio-like antenna. Being constantly on and active makes a PC truly network-centric.
- ■Information is sent proactively according to customer-provided preferences — and displayed as channels that can be selected. Some pundits have even suggested that these channels could supplant the Windows interface. The "invited push media" can relieve users of having to go back to their favorite Web sites just to see if anything is new. It is a big step toward the real use of agent technology. On the other hand, push media can easily lead to the proliferation of junk mail and is barely distinguishable from
- ■Broadcast technologies can send text, graphics, audio and even video files to a PC during off-hours, when there is substantial unused bandwidth. The ability to efficiently download custom multimedia information creates the potential for truly personal TV, with programs that can be watched any time.
- ■There is a heavy emphasis on Sun's Java as the means to deliver complex content, although the channel concept is intrinsically hardware- and softwareindependent. Marimba was founded by several key members of the original Java development team.
- ■Vendors typically provide client software for free. They make money by selling required server software and sometimes, as with PointCast, advertising.

Current products are aimed mostly at individuals, but businesses will adopt push media technology to automatically distribute mass-customized information internally and externally. For example, in-

Moschella is senior vice president of research at Computerworld, Inc. His Internet address is david\_moschella@cw.com.

stantly and inexpensively notifying customers of relevant product availability, price changes and special offers would

represent a big step toward true electronic commerce. Witness the close cooperation between Lotus and PointCast.

And this is clearly just the beginning. Microsoft and America Online are increasingly adopting the channel

vices. Intel CEO Andy Grove's latest



stump speech emphasized the coming competition between PCs and TVs for the eyeballs of society. Perhaps most important, the recent compromise between TV and computer manufacturers over digital TV specifications could

metaphor to describe their online ser- eventually blur the lines between PCs and TVs altogether.

#### Computerworld's **Industry Journals**

Special magazine supplements, specific to four major business industries: financial services, retail, healthcare and telecommunications.

The Computerworld Journals are written for IS and business management working together to deploy distributed computing for the enterprise. Each journal gives you pertinent coverage on critical technology trends and products, implementation challenges and management issues -- all in the context of what impact this information has for your organization and the industry you work in.

For editorial information contact: Alan Alper Editor, Computerworld Journals Phone: (508) 820-8115 E-mail: alan\_alper@cw.com

For advertising information contact: Don Calamaro Manager, Computerworld Journals Phone: (610) 446-5372 E-mail: don\_calamaro@cw.com

The Newsweekly for Information Technology Leaders

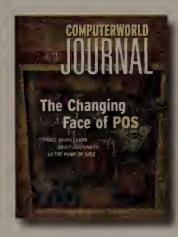


Financial Services Journal For technology and business management at banking and financial institutions.

Publishing in Computerworld: Feb. 3 • Apr. 7 • June 2 • Aug. 4 • Oct. 6 • Nov. 3

Retail Journal For technology and business management at retail organizations.

Publishing in Computerworld: Feb. 3 • Apr. 7 • June 2 • Aug. 4 • Oct. 6 • Nov. 3





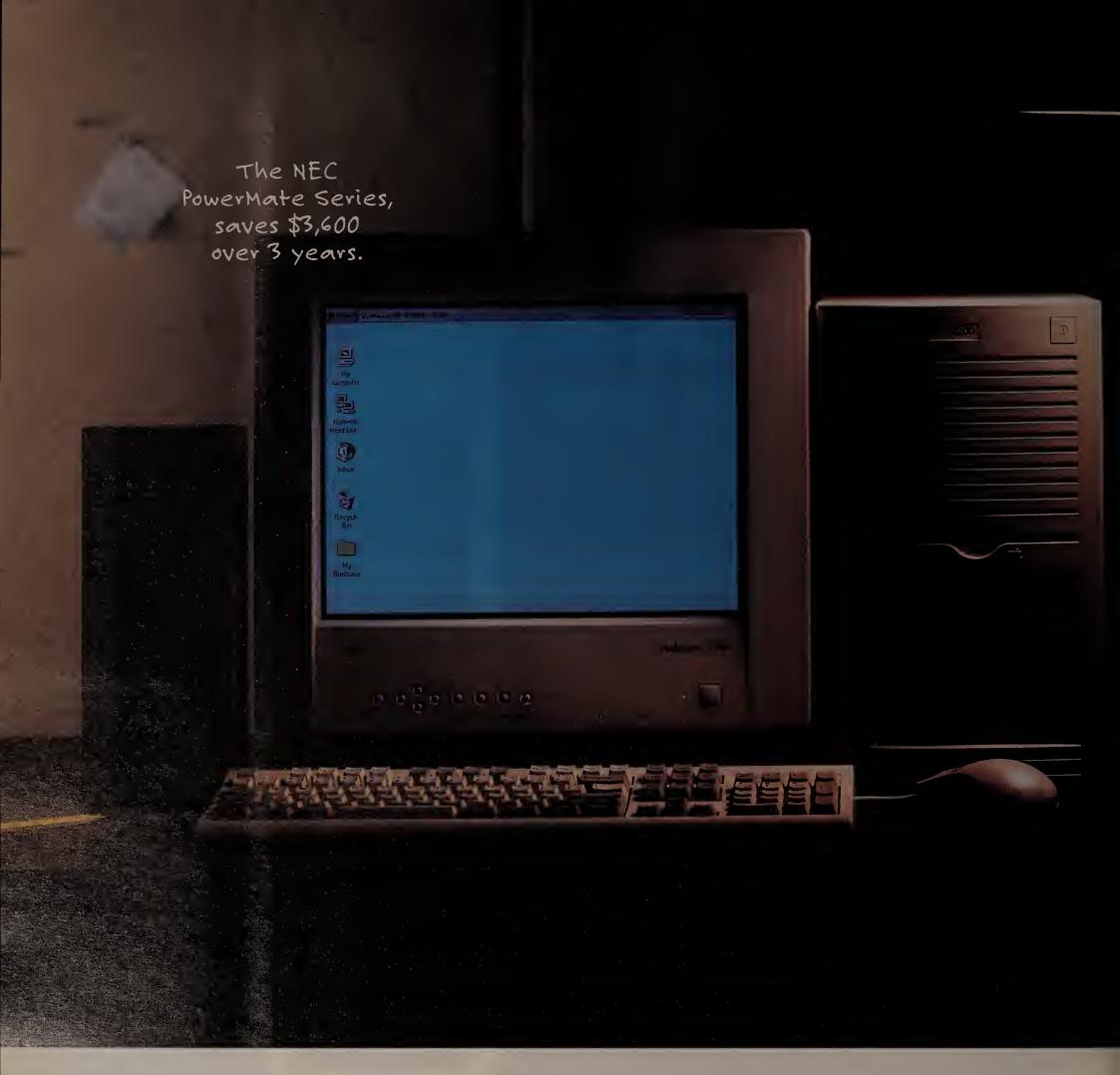
Telecom Journal For technology and business management at telecommunications or telecom-related organizations.

Publishing in Computerworld: Feb. 17 • May 19 • Aug. 18 • Oct. 20

Healthcare Journal For technology and business management at hospitals and healthcare related companies.

Publishing in Computerworld: Feb. 17 . Apr. 21 . June 16 . Aug. 18 . Oct. 20 . Nov. 17





Where is it written that cutting costs has to be a cruel, ruthless act?

Take the new NEC PowerMate® Series, for instance. To most people, it's a sophisticated workhorse that enables them to be more productive. To you, however, it's an effective way to lower costs by reducing system downtime and increasing end-user efficiency.

The fact is, each PowerMate system can save up to 15% of the total cost of desktop ownership, thanks to advanced pentium features that provide efficient network management.\*

THE NEC POWERMATE SERIES.

QUITE POSSIBLY THE ONLY

COST-SAVING MEASURE THAT WON'T

UPSET YOUR EMPLOYEES.

15-watt bulb, saves \$25.75 over 3 years.

> Generic brand coffee, saves \$4.50 over 3 years.

Exclusive MagicEye™ technology continually monitors the system's health, including hard drive activity, temperature and voltage. And, if a problem is detected, IS managers can remotely access the system via Intel's LANDesk® Client Manager 3.0. What's more, CyberMedia's FirstAid 95 Deluxe automatically fixes configuration errors and, along with McAfee's anti-virus software, protects valuable data.

What does it all add up to? Quite simply, fewer problems and more productivity. Now isn't that a cost-saving measure everyone can live with?

For more information, call 1-800-NEC-INFO, or visit us on the web at http://www.nec.com.

Artificial ficus,

saves \$142.68 over

3 years.

SEE, HEAR AND FEEL THE DIFFERENCE.™

NEC

### TTERS

### IRS modernization is a mess, but is it really costing us \$50B?

'M LOOKING at your magazine's otherwise excellent article about incompetence at the IRS ["IRS project failures cost taxpayers \$50B annually," CW, Oct. 14]. On the front page, it says that this has cost taxpayers \$50 billion, but it would seem to me that if the government has failed to collect said amount, the taxpayers have actually saved \$50 billion.

That's \$50 billion that went to Bill Gates to build his house (he has earned it; the IRS hasn't), to an

extra vacation for someone, to start new companies, to invest in publicly traded companies, to helping the Dow pass the 6,000 mark. That's \$50 billion not in the hands of an incompetent federal government but in the hands of citizens who have earned their money and have every moral right to spend it.

Seems like a good deal to me.

Frode L. Odegard President, chairman and CEO Odegard Labs, Inc. Pasadena, Calif. frode@odegard.com

RY TO IMAGINE putting your money into a bank that shared the IRS' track record with modernization. You have made an excellent case for what libertarians have been saying for the past 25 years: Government doesn't work.

Any business run the way the IRS and the federal government are run wouldn't last a month. As forward-looking people, computer professionals should be



ashamed to feed off the public trough by doing any work for the IRS.

Michael Martin Cockeysville, Md. mbmartin@gnn.com

N YOUR OCT. 14 issue, you made a mistake. The headline on the front page reads, "IRS project failures cost taxpayers \$50B annually." I think it should read, "IRS project failures save taxpayers \$50B annually." I mean, after all, taxpayers pay \$50 billion less in taxes annually.

> Eric Katsov CEO

Katsov Business Solutions, Inc. Hoboken, N.J. erick4@mail.idt.net

RAVO ON SOME good old-fashioned investigative journalism on the IRS. In addition to your list of things \$50 billion in savings could buy, I add help for the one out of five U.S. children in poverty. That rate is the worst among industrialized nations, according to a radio report I heard this morning just before reading your report.

Thanks for your courage and professionalism.

> Frances Harriman Emeryville, Calif. fharriman@upstart.com

The IRS software mess featured on page 1 of the Oct. 14 issue of Computerworld happens too often. I propose these practices be accepted as a minimum set of ethical behaviors when preparing software deemed critical by the customer or the supplier:

- I. A software architect and project manager are explicitly named, and both attest that the software is "fit for use."
- 2. They analyze software risks and document their findings.
- 3. They make sure that user interfaces are intuitive and easy to use, that "help" is helpful, that personal information is protected and that the ergonomics of the system were designed with care.
- 4. They understand the problem and don't just accept the customer's solution. 5. They follow formal documented software development processes.
- 6. They respect property, copyright, patent and privacy rights.

Larry Bernstein President National Software Council Short Hills, N. J.

ow no you figure that the IRS not collecting \$50 billion costs me? It reminds me of an IRS high muck-amuck who said in one of your articles that the IRS was a profit center. Oy vey!

> Jim Murray Maumee, Ohio jmurray@expost2.lof.com

### What a wise guy

ike Galileo, we who embrace new IS truths risk the scorn of wise guys like Michael Schrage. He dismisses the current wave of enthusiasm for knowledge management in favor of what he predicts will be the next paradigm: "wisdom management'' ["Why stop at knowledge management?" CW, Nov. 11].

Very funny. The fact is that technology (E-mail, groupware, intranet) enables organizations to accelerate knowledgesharing by building it in to the business

If culture and incentives are supportive, people learn faster and create more value for their employer. History will prove that knowledge management is like rock 'n' roll: here to stay.

> Mark Rosenman Knowledge Manager Project KPMG Peat Marwick LLP Montvale, N.J. mrosenma@kpmg.com

### Network computing is for retro-boneheads

**UDOS** TO Computerworld columnist David Moschella for "The net computer fantasy" article [CW, Nov. 25] and to news editor Patricia Keefe for her editorial along the same lines ["Too good to be true," CW, Nov. 18].

I was gratified to learn that not everyone is taken in by the latest hype. It especially warms my heart to see that two people from one of the major IS trade journals are similarly cautious when it comes to the net computing paradigm.

I cannot for the life of me see why any IS manager would consider doing a "dumb-terminal retro" like this. Besides the benefits of traditional client/server that you mention, what about distributed processing, distributed storage and the user autonomy/empowerment that those bring? Not to mention the very real possibility that the money to be saved in client administration costs with net computing will be more than eaten up in increased bandwidth expense, more expensive server hardware, very complex and expensive application server software and

If these non-Wintel net terminals are successful, I bet that within two years, Sun/Oracle/Whoever will introduce a net computer with its own hard drive, its own CD-ROM and so on that will cost about twice what a similar Wintel setup does and run only software written in Java on its own proprietary chip. Then all these retro-boneheads will end up "upgrading" because they suddenly find the need for more client-side power.

Don't get me wrong - I'm not defending what the Wintel alliance has done to IS budgets in the past few years. But it seems very foolish to advocate the replacement of the current semiproprietary client-centric computing model with an almost totally proprietary server-centric computing model.

Dave Fladebo IS manager St. Cloud, Minn. gosptsco@cloudnet.com

### 'Stay off the Internet' is poor advice for corporate America

N MICHAEL COHN'S Nov. 25 Computerworld column ["For business, the Internet still doesn't compute"], he states that "The Internet is no place for corporate America. Stay off it."

If corporate America does not stay on the Internet and learn to utilize the features and benefits it has to offer, it will not be competitive in the marketplace

The Internet is not only a place to communicate effectively, it is also a new, open environment for purchasing agents to shop freely without global limits. The Internet has put countless unique, hard-tofind products, pricing and information in hands that otherwise would not have a cess to them.

My advice to corporate America is to stay on the 'net: that's where the business of today is being transacted.

> Carol Blake President Blake & Associates Abita Springs, La. blake@neosoft.com

### **Secure Intranet Report Distribution.**

REVEAL software automatically captures corporate computer reports and builds an indexed on-line report

warehouse accessible from local and remotely-connected PCs.

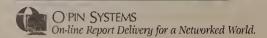
And our PinPoint<sup>TM</sup> page-level viewing and printing security is enforced for every user.



### **REVEAL** benefits:

ACTIONABLE	SCALABLE	FLEXIBLE	RELIABLE	USABLE
Desktap taals search, extract, analyze, annotate and expart.	Intranet and client/server optimized architecture.	On/aff-line report viewing fram PCs, Brawsers, Lotus Nates.	REVEAL technology is market-proven.	Turnkey, easy-to-instoll, easy-to-learn, autamatic updating.

### Available Today. REVEAL can go online immediately in your organization.



800-888-1804

www.opin.com

### COMPUTERWORLD

trade Cy

Yes, I want to receive my own copy of COMPUTERWORLD each week. I accept your offer of \$39.95\* per year - a savings of over 73% off the single copy price.

rirst (vame	INI	Last Name	
Title	Company	E-mail address	
Address Shown:	City ☐ Renew Single copy price: \$3.00/issue	State Zip *U.S. Only. Canada \$95, Mexico, Central/South Amer	ica \$150, Europe \$295, all other countries \$295.
BUSINESS/INDUSTRY (Circle one)		e the questions below.	3. Do you use, evaluate, specify, recom-
<ol> <li>Manufacturer (other than computer)</li> <li>Finance/Insurance/Real Estate</li> <li>Medical/Law/Education</li> <li>Wholesale/Retail/Trade</li> <li>Business Service (except DP)</li> <li>Government - State/Federal/Local</li> <li>Communications Systems/Public Utilities/Transportation</li> <li>Mining/Construction/Petroleum/Refining/Agriculture</li> <li>Manufacturer of Computers, Computer-Related Systems or Peripherals</li> </ol>	90. Computer/Penpheral Dealer/Dist./ Retailer 95. Other	31. Programming Management, Software Developers 41. Engineering, Scientific, R&D, Tech. Management 60. Sys. Integrators/VARs/Consulting Mgt. CORPORATE MANAGEMENT 11. President, Owner/Partner, General Mgr. 12. Vice President, Asst. VP 13. Treasurer, Controller, Financial Officer DEPARTMENTAL MANAGEMENT 51. Sales & Mktg. Management 70. Medical, Legal, Accounting Mgt. OTHER PROFESSIONAL MANAGEMENT	mend, purchase: (Circle all that apply)  Operating Systems  (a) Solaris (e) Mac OS (b) Netware (f) Windows NT (c) OS/2 (g) Windows (d) Unix (h) NeXTstep  App. Development Products  Yes  Networking  Yes  Networking Products  Yes  Networking Products  Yes  Networking Products  Yes  Networking  Yes  Networkin
Systems Integrators, VARs, Computer Service Bureaus, Software Planning     Consulting Services	Planning, Administrative Services 23. Dir./Mgr. Sys. Development, Systems Architecture	<ol> <li>Information Centers/Libraries, Educators, Journalists, Students</li> <li>Other Titled Personnel</li> </ol>	(a) □ Internet browsers (b) □ Internet browsers (c) □ Web authoring/development tools  B4&6 D

### COMPUTERWORLD

Yes, I want to receive my own copy of COMPUTERWORLD each week. I accept your offer of \$39.95\* per year - a savings of over 73% off the single copy price.

Title	Company	E-mail address		
Address	City	State	Zip	

### Please complete the questions below.

- 1. BUSINESS/INDUSTRY (Circle one) 10. Manufacturer (other than computer)
  - 20. Finance/Insurance/Real Estate
  - 30. Medical/Law/Education
  - 40. Wholesale/Retail/Trade
  - 50. Business Service (except DP)
  - 60. Government State/Federal/Local
  - 65. Communications Systems/Public Utilities/Transportation
  - 70. Mining/Construction/Petroleum/ Refining/Agriculture
  - 80. Manufacturer of Computers, Computer-Related Systems or Peripherals
  - 85. Systems Integrators, VARs, Computer Service Bureaus, Software Planning & Consulting Services

- 90. Computer/Peripheral Dealer/Dist./ Retailer
- 95. Other

trade C1

- (Please specify)
- 2. TITLE/FUNCTION (Circle one) IS/MIS/DP MANAGEMENT
  - 19. Chief Information Officer/Vice President/ Asst. VP IS/MIS/DP
  - Management
    21. Dir./Mgr. MIS Services, Information Center
  - 22. Dir./Mgr. Network Sys., Data/Tele. Comm., LAN Mgr./PC Mgr., Tech. Planning, Administrative Services
  - 23. Dir./Mgr. Sys. Development, Systems Architecture

- 31. Programming Management, Software Developers
- 41. Engineering, Scientific, R&D, Tech. Management
- 60. Sys. Integrators/VARs/Consulting Mgt.

#### CORPORATE MANAGEMENT

- 11. President, Owner/Partner, General Mgr.
- 12. Vice President, Asst. VP
- 13. Treasurer, Controller, Financial Officer
- DEPARTMENTAL MANAGEMENT
- 51. Sales & Mktg. Management
- 70. Medical, Legal, Accounting Mgt.
- OTHER PROFESSIONAL MANAGEMENT
- 80. Information Centers/Libraries, Educators, Journalists, Students
- 90. Other Titled Personnel

- Do you use, evaluate, specify, recom-mend, purchase: (Circle all that apply)
  - Operating Systems
  - - (e) Mac OS (f) Windows NT
  - (b) Netware (c) OS/2
    - (g) Windows
  - (h) NeXTstep
  - App. Development Products ☐ Yes ☐ No Networking Products ☐ Yes ☐ No
- Intranet Products 4. Which of the following software products
- do you buy, specify, recommend or approve the purchase of? (Please check all that apply)
  - (a) Internet software
  - (b) Internet browsers
  - (c) Web authoring/development tools

B4&6 D

**BUSINESS REPLY MAIL** 

FIRST-CLASS MAIL PERMIT NO. 55B MARION OH

POSTAGE WILL BE PAID BY ADDRESSEE

### **COMPUTERWORLD**

P O BOX 2044 MARION OHIO 43306-4144 NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES





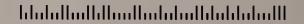
**BUSINESS REPLY MAIL** 

FIRST-CLASS MAIL PERMIT NO. 55B MARION OH

POSTAGE WILL BE PAID BY ADDRESSEE

**COMPUTERWORLD** 

P O BOX 2044 MARION OHIO 43306-4144 NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES



# Don't Be Left Out Of The ComNet Spotlight!

### Join Lucent Technologies in our New Product Showcase



Join the ranks of the elite... FTP Software, Hughes Network Systems, Lucent Technologies Multimedia, networkMcIteleconferencing, Network Services Group, Teleos Communications, Teleport Communications Group, U.S. Robotics and Visual Networks, Inc. ComNet '96 garnered over 800 media impressions while 45,000 attendees ranging from industry professionals, analysts and press previewed over 350 new products, spanning a four-day period.

What Better Way Is There To Make Your Product Stand Out Above The Rest?

Awards will be presented in 9 Categories representing the Communications and Networking market, they include:

Internet/IntraNet Switching Technology Remote Access/Wireless Network Management Infrastructure Software & Applications LAN and Internetworking Multimedia & Desktop Carrier/WAN Services

### **Grand Prize** — Most Innovative New Product or Service

**Eligibility:** All ComNet '97 contracted exhibitors debuting a new product, product enhancement and/or product upgrade at ComNet '97 or within eight weeks preceding ComNet '97 in Washington, D.C. are eligible.

**Entry Submissions:** Please contact Cress O'Brien at MHA Event Management at 617/440-2756 or via Email at cobrien@mha.com, or 1400 Providence Highway, Norwood, MA 02062.

**Sponsor:** *Computerworld,* The Newspaper for Information Systems Management is the proud sponsor of the ComNet '97 New Product Achievement Awards Competition.

COMPUTERWORLD
The Newsweekly for Information Technology Leaders

SAS Institute. Software Data Warehouse for 18/ die "Jon 288/4 Nest. Successful Decision Making.

### The Top New Data Warehousing Software

As the only end-to-end solution for rapid data warehousing, SAS software

delivers everything you need to manage, organize, and exploit your business data. The tools you use to build a data warehouse are the same ones used to maintain it...run it...and change it. And what's more, everything's scalable. You can jump right into enterprise-wide information delivery applications...or start small and build on your success.

SAS software doesn't consume overhead for database features you don't need. And once you have data in the warehouse, you'll find everything you need for data query and reporting, OLAP/multi-dimensional analysis, data mining, database marketing, data visualization, and much more. It's never been easier to access your data... or to arrive at informed decisions by turning raw data into real information.

When 200,000 IS managers were asked to

choose the top software for data warehousing,

their answer had a familiar ring:

SAS software from SAS Institute.

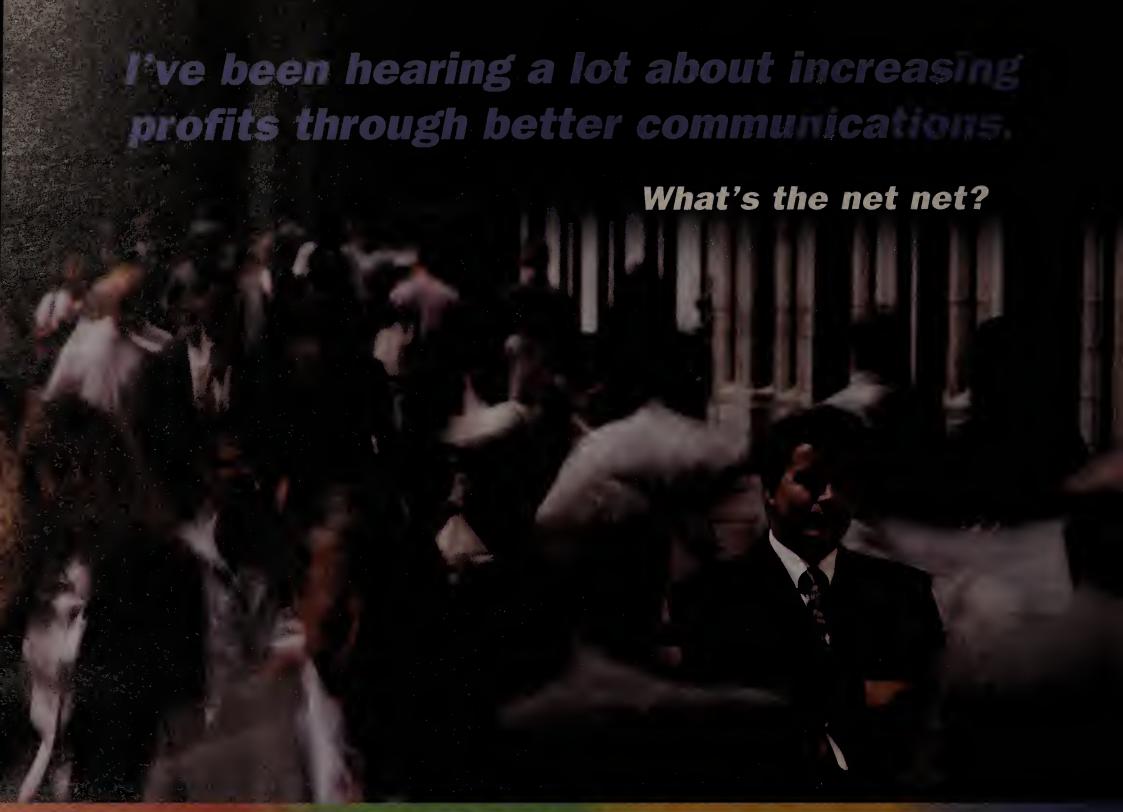


Software for Successful Decision Making

Phone 919.677.8200 Fax 919.677.4444 In Canada 1.800.363.8397

You can also request your free CD ROM, and learn more about SAS seminars in your area, by visiting us on the World Wide Web at http://www.sas.com/

E-mail: cw@sas.sas.com



### Microsoft Internet/Intranet solutions.

Come to a free, half-day briefing and find out how the right solutions can help your company work smarter—and more profitably.

As you know all too well, talk is cheap, but technology isn't. That's why we're cutting through all the chatter to provide you with a strategic overview of new technologies which can help keep information, work and profits all moving together.

You'll get an inside look at Microsoft technologies for today and tomorrow, including highlights of the latest Internet/Intranet developments and how they're incorporated in many of our products. You'll observe the latest Microsoft-based solutions for taking advantage of Internet business opportunities, maximizing the benefit from communication-enabled line-of-business applications, enhancing team collaboration with a company Intranet, and more. You'll see

uniquely qualified to provide you with solutions at an unprecedented level of functionality. And you'll have a chance to sign up with a Solution Provider to conduct a customized evaluation of Microsoft Internet and Intranet products, the latest version of Microsoft Office, Windows® 95, BackOffice™, and development tools.

If you're a business decision maker or information technology professional in an organization with 100 or more employees, and you need to use technology to accomplish business objectives, this briefing is for you.

Call (800) 836-8282, Dept. A778 today to get information about a briefing near you.

Corporate
Solutions
Briefing



**Microsoft** 

©1996 Microsoft Corporation. All rights reserved. This document is provided for informational purposes only. MICROSOFT MAKES NO WARRANTIES, EXPRESS OR IMPLIED, IN THIS SUMMARY. Microsoft and Windows are registered trademarks and BackOffice and Where do you want to go today? are trademarks of Microsoft Corporation

first-hand how Microsoft Solution Providers are

WHERE DO YOU WANT TO GO TODAY?





# Systems & Network Management

Proactive Management Tools Mean Business

Part 4 of a 4-part series on Enterprise Software Directions



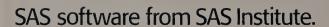
As Featured in COMPUTERWORLD and SCFTWARE

SAS®

# The Top New Data Warehousing Software When 200,000 IS managers were asked to

choose the top software for data warehousing,

their answer had a familiar ring:



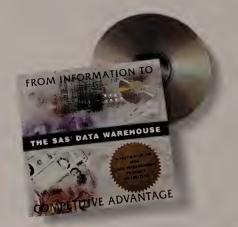
As the only end-to-end solution for rapid data warehousing, SAS software delivers everything

you need to manage, organize, and exploit your business data. The tools you use to build a data warehouse are the same ones used to maintain it...run

it...and change it. And what's more, everything's scalable. You can jump right into enterprise-wide information delivery applications...or start small and build on your success.

SAS software doesn't consume overhead for database features you don't need. And ouee you have data in the warehouse, you'll find everything you need for data query and reporting, OLAP/ multi-dimensional analysis, data mining, database marketing, data visualization, and much more. It's never been easier to access your data...or to arrive at informed decisions by turning raw data into real information.





Software for Successful Decision Making

Phone 919.677.8200 Fax 919.677.4444 In Canada 1.800.363.8397

You can also request your free CD ROM, and learn more about SAS seminars in your area, by visiting us on the World Wide Web at http://www.sas.com/

E-mail: cwsentry@sas.com

SAS is a registered trademark of SAS Institute Inc. Capyright © 1996 by SAS Institute Inc.

Institute.

**Software** 

for

Successful

Decision

Making.

### Introduction



### Proactive Management Tools: They Mean Business

Proactive management. Mere buzzword? Or does the term offer a meaningful description of more productive IT management practices and tools?

In this White Paper, International Data Corp. (IDC) intends to answer that question. IDC will sift through the clamor surrounding proactive management in order to develop a clear definition of the term and discover what relevance proactive management — and the lack thereof — holds for network and systems managers.

IDC will also examine the proactive management capabilities available in tools currently being used now as well as those that are emerging in the marketplace. When users of management software finish this White Paper, they will be better able to judge the promises of vendors who claim to deliver proactive management.

This White Paper was written by IDC's distributed management research team. This research and consulting practice focuses on distributed management products for distributed LANs, desktops, servers and applications. The analysts in this group cover worldwide use of SNMP management platforms; hub, switch and router management packages; RMON management probes; and application and PC/server management suites.

IDC, which frequently assists leading IT firms in defining their marketing, positioning and technology strategies for management product lines, is headquartered in Framingham, Mass. The market research and analysis firm covers the world of technology with more than 350 analysts in more than 40 countries. IDC can be reached at www.idcresearch.com.

# Much Activity in Proactive Management

hy spend time trying to understand the promise of proactive management? There's a good answer to this question:

Your business may depend on it.

IS is overwhelmed by the proliferation of distributed systems, network-based applications and Internet clients. Everything, from routine clerical functions and basic internal communications to collaborative design processes and time-critical transaction processing, has been moved onto LANs, creating a premium on network availability. With networked applications fueling innovation in products and services, IS is often made a partner in product development. With time-to-market crucial, limitations in systems and network management capabilities can be a very costly bottleneck.

A recent IDC survey of 500 IS managers shows the urgency they feel towards IT management objectives (Figure 1). Nearly a third of them call network device performance a top priority, while 28% label it a short-term goal. Only 10% considered their network device performance objectives already met.

A second area of urgency is applications performance. Nearly 60% of the managers rated this a top priority or short-term goal. Only 7% were content with their current solution (see Figure 2 on p. 4).

Administration of desktops and servers is in only slightly better shape. Only 15% of the respondents considered their management objectives met with respect to desktop administration, and only 20% saw their server administration objectives met.

One thing is clear: Most IS managers are dissatisfied with their existing management solutions. And with few business managers currently willing to in-

crease corporate overhead by adding to IS staffs, the quandary for IS is how to improve services, manage growth and meet escalating business objectives while controlling costs (see Figure 3 on p. 8).

Management tools represent the only way out of this ever-tightening trap. Not only tools that automate redundant management tasks, but tools that provide administrators with information they can use, such as baseline or resource utilization data, to improve network performance. Such tools offer far more value than those whose sole purpose is to improve fault and configuration management.

Here, then, is the value proposition of proactive management: Improved network performance (often measured by availability) reduces troubleshooting requirements, so administrators can devote more time and resources to management tasks, which will minimize future problems. Figure 4, on p. 13, illustrates this cycle.

### FIGURE 1

### Urgency to Meet Objectives for Network Device Performance Management

(% of respondents)

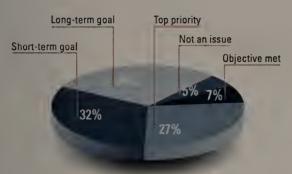


Source: International Data Corp., 1996

### FIGURE 2

### Urgency to Meet Objectives for Application Performance Management

(% of respondents)



Source: International Data Corp., 1996

Given the contributions IS is expected to make to a business in product development, customer service and operational infrastructure, proactive management is not just an IS goal; it is required to improve the competitiveness of technology-intensive businesses. Most current management tools are largely reactive. But this White Paper will evaluate a few proactive solutions in the network management arena, where proactive solutions are being created faster than in the systems management arena.

### Reactive management

The current network management paradigm — sites with network management platforms, network element management applications and RMON probes and consoles — offers a range of fault, configuration and performance management functions. These tools keep environments up and running, but offer little direct support of the processes to evaluate and improve a network.

Network management of distributed environments began in the early 1990s with widespread adoption of SNMP instrumentation by vendors and customers. With a common means of communicating with and defining characteristics of network devices, information could be collected across multivendor devices. Remote device discovery and communication of status information to a centralized console gave administrators consistent topological and status information for many devices — a basic requirement for fault isolation. When alarms

were added to tell administrators which devices were down, problem isolation went from being nearly impossible to merely difficult.

The natural follow-on to providing the instrumentation and consolidation point was the device-oriented configuration tool. Network element management applications enabled administrators to configure all aspects of devices remotely, as a group or individually. With vendors able to develop device-specific management functions, management software became a key in the sale of network devices.

But limitations in topology, status and remote configuration capabilities soon became apparent. SNMP data offered no information on ongoing device performance, but RMON and RMONv2 addressed this by driving instrumentation further up the protocol stack. RMON captures data at the physical and data link layer; RMONv2 gathers statistics through the application layer. RMON probes and consoles now provide excellent visibility into real-time device performance and bandwidth utilization. In most networks, realtime analysis of RMON statistics represents the current apex of management solutions. Yet this advance in network management is not a means to proactive management.

### Network management platforms

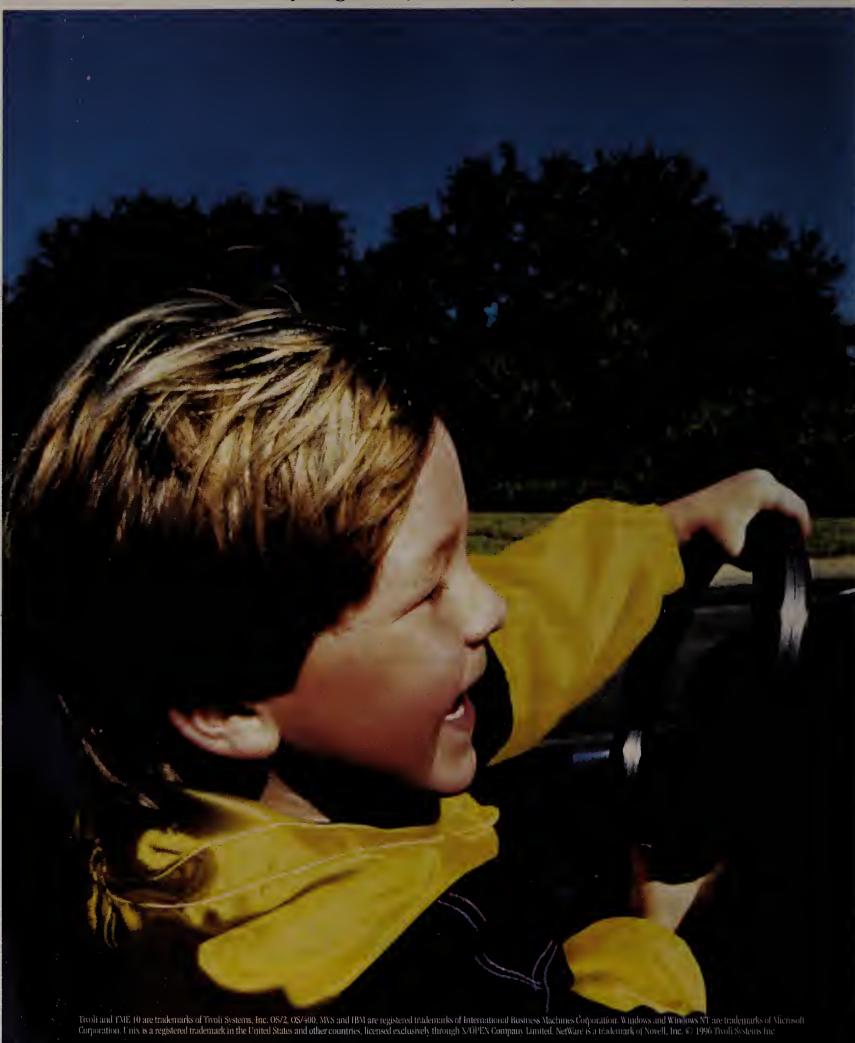
Network management platforms are often criticized for not delivering on the promise of integrated management. It is also true they usually receive no credit for the critical role they do play in management environments. But this role is not one of proactive management. Network (or SNMP) man-

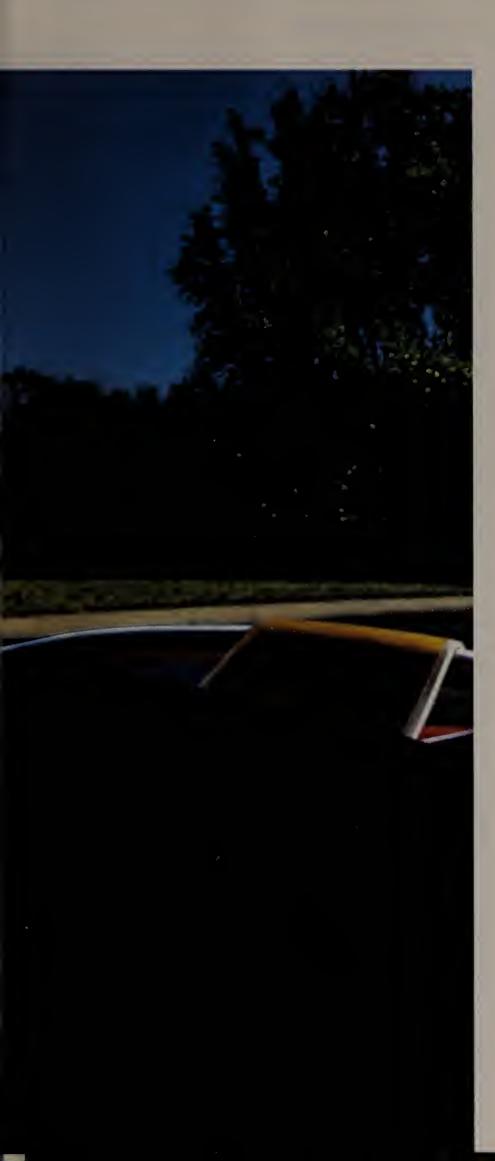
### Proactive Management Tools Defined

Proactive management tools bring information to an administrator's attention, enabling him or her to take action to improve or ensure future network performance. This information is not the direct result of a device or system fault, but is instead based on analysis of historical network activity.



### Remember the thrill you got the first time you were in complete control?





### The feeling's back.

Sure you were nervous when you got behind the wheel, but once you got the hang of it, barreling that baby round the track put you on top of the world.

Today, you're trying to manage something that's a lot more complicated. A network computing environment that includes mainframes, servers and desktops scattered all over the planet. You need a management solution. A smart one.

Maybe that's why so many companies are relying on us to bring order to the way they do business. Which is what Tivoli TME 10™ is all about. Because it's the only mainframe-to-desktop management solution that's highly scaleable, truly open and capable of operating transparently across all major platforms (including the most popular versions of UNIX,® NetWare,® Windows,® Windows NT,™ MVS,® OS/2,® and OS/400®). Plus, with Tivoli Manager for Applications, it's the one and only proven environment for mission-critical applications management.

And now, with all the worldwide resources of IBM® behind us, we also deliver unmatched service and support wherever you do business.

So, if you're ready to get back in complete control, give us a call. We can put you behind the wheel again.

1 800 965-8548 www.tivoli.com



Managing Network Computing. The Smart Way.

agement platforms provide network operations management services such as device discovery that deliver realtime status information on managed nodes, but offer little analytical capability.

Although management platforms do enable administrators to set thresholds on a device-by-device basis (ideally, a way to identify a problem before it leads to device failure), a series of alerts based on thresholds alone requires complex and resource-intensive event correlation if any predictive information is to be derived. Event correlation for reducing alarms and improved fault isolation can lead to vast improvements in managing network operations, but it is not proactive. It can be the means to build a proactive management capability above a network management platform, but only for users who can afford the investment in technology and expertise.

### Network element management applications

Network element management applications, e.g., Optivity from Bay Networks, Transcend from 3Com or CiscoWorks from Cisco Systems, provide tight linkages with network devices. Clearly, hardware vendors have the ability to "instrument" (pull information from) devices in a proprietary manner and provide customers with unique management capabilities. This model may generate a greater possibility of providing true proactive management than management platforms, because it needs to correlate data across only one vendor's device.

Network element management applications provide greater visibility into managed devices, but that in itself is not proactive management.

### RMON probes and consoles

Some might argue that RMON and RMONv2 facilitate proactive management. However, the traditional RMON console which presents RMON data in realtime is proactive only for users capable of "mental correlation". . . or for those willing to output data and conduct piecemeal analysis.

Realtime visibility into RMON data gives network managers valuable information about the performance of network segments. Yes, it is possible to analyze this information in order to optimize performance and perform capacity planning — two proactive management functions. And yes, there are

network administrators who can synthesize realtime data from multiple segments and come to meaningful conclusions about future operations. But IDC considers this a poor management practice because it is time-consument, inherently unscalable and asks too much of the administrator.

To analyze management data more effectively, administrators must have access to historical performance trends and the ability to do computations on this data. An RMON probe and console provides access to this data, but can neither store data effectively over time (without consuming an unreasonable amount of memory) nor conduct appropriate analyses. So administrators determined to analyze management data must export data and perform calculations in a spreadsheet or statistical package. This

#### FIGURE 3

### The Pressures on IS Staffs Continue to Mount



Source: International Data Corp., 1996

forces time-constrained administrators to conduct proactive management at the risk of losing focus on continuing operations.

In reality, RMON data collection facilities and consoles are a sophisticated fault resolution tool. Managers can use the realtime visibility to drill down on problems that have been identified, and to pinpoint potential trouble spots; but RMON deployment is not a means to perform regular analysis of historical trends and predict future performance.

If traditional network management tools cannot deliver true proactive management, where does that leave network administrators? They must look to the proactive management solutions now emerging,

even if it means sacrificing immediate integration of management tools. Products that offer fully integrated proactive management, i.e., full data sharing across OS platforms and management disciplines, are still on the drawing board.

Vendors that offer management solutions that provide predictive value with little or no additional analysis required include:

- NetSys Technologies, which tackles router performance through improved configuration management. (The Palo Alto company was just purchased by Cisco.)
- Compuware, Farmington Hills., Mich., whose EcoNet offers application traffic statistics and response time measurements.
- Concord Communications, a Marlboro, Mass., company that is making a business out of performance reporting.
- Ganymede Software, in Research Triangle Park, N.C., which uses traffic generation to test "live" networks to root out trouble spots.
- Optimal Networks, in Mountain View, which builds a network model off real traffic to predict the impact of application deployment and configuration changes.

Vendors such as these are enhancing their tools by adding analysis of management data atop mere access to that data (see Fig. 5 on p. 15). Historical and statistical analysis of management data assists administrators in making decisions. Trend data provides baseline information on network performance, giving them a starting point from which to judge future performance. From here, network managers address more vexing questions regarding hardware optimization and capacity planning.

Capacity planning is the process of determining how much bandwidth a certain class of users or resources requires. This process can also review hardware performance under different circumstances, allowing administrators to optimize device usage across their environment. But without data on capacity utilization over time, any attempt to address this question is mere guesswork.

With trend-based performance data across multiple segments, network managers can look for innovative ways to get more out of their current gear. This might entail a reconfiguration or shift of traffic flows. (Any major delay in purchasing new network hardware, without compromising performance, is welcome by those who control the purse strings.)

Products offering these forms of proactive management functions come in three classes:

- Trend analysis products collect industry-standard management data from diverse sources,
  - synchronize the data over time, analyze the data and deliver summary reports with actionable conclusions. Such products leverage existing instrumentation and can provide consistent information across a large number of devices.
- Simulation and modeling products let administrators test different configuration scenarios and usage patterns to optimize performance and plan for new equipment and upgrades. This way, they can determine the impact of an application rollout without endangering ongoing operations.
- Task-specific products focus on one management task or requirement, collect only the data needed to answer a narrow question, and present the result in an actionable format. Vendors access this specific data via proprietary technology. The value of this such products rests in the combination of proprietary data oriented to a specific management problem and an actionable presentation of conclusions.

#### Trend analysis

More and more administrators are recognizing the value of automated analysis and reporting of management data, which provides them with exception and summary reports on activity across their entire environment. Exception reporting lets an IS staff quickly isolate potential trouble spots and solve problems before service is affected. Summary performance statistics can quickly show that network activity is normal and in no need of immediate action. Armed with this high-level information, they can allocate staff time and resources more efficiently.

This challenge is being addressed by product vendors such as BBN Corp., Cambridge, Mass., BGS Systems, Waltham, Mass.; Concord Communications; DeskTalk Systems, Torrance, Calif.; Kaspia Systems, Beaverton, Ore.; and SAS Institute, Cary, N.C. Service providers, such as Sunnyvale-based INS, offer monitoring services that perform a simi-



# Harness the Power of your Distributed Environment





### PATROL

The true potential of your distributed environment is right there, waiting to be harnessed. The PATROL® Management Suite of products gives *you* the power. PATROL helps you better support your end users by ensuring their critical applications and data are available – 24 hours a day, 365 days a year.

PATROL proactively monitors a wide range of availability and performance indicators for each managed software solution, discovering errors and correcting problems – when authorized – before end users are affected. Supporting higher availability and performance for more leading applications, databases, middleware, Internet servers, and resources than any other management product. So your end users remain productive.



PATROL management support is available today for more than 30 leading software solutions, including SAP R/3, PeopleSoft, Oracle, Sybase, Informix, TUXEDO, Lotus Notes, Internet servers, and your in-house applications. Scaling efficiently across thousands of servers running Unix, NT, OS/2 or MVS. And integrating seamlessly with your existing system and network management frameworks, including HP OpenView.

PATROL technology is being used on tens of thousands of servers around the world. PATROL is the only application and data management product shipped with every Digital AlphaServer worldwide, and PATROL will be the only management product embedded on Intel's new i960 processor. No wonder leading analysts and consultants are calling PATROL the "clear choice" for managing applications and data across distributed systems.

### BIMC SOFTWARE

For a copy of the most recent analyst reports and other information, CALL **800 841-2031** or 713 918-8800 or visit us on the Web at: www.bmc.com/patrol

Harness the Power-Today!

lar function while isolating users from set-up and administration tasks.

Concord Communications offers a range of network monitoring software solutions. Its core product, Network Health, is a trend-based analytical engine that collects and analyzes management data and produces reports on performance and utilization of network resources. It performs behavior baselining, exception reporting and trend analysis.

Concord offers four reporting applications: LAN Health, which measures network activity on a per segment or ring basis; WAN Health, which presents error rates, router performance information and bandwidth utilization statistics; Frame Relay Health, which measures utilization and congestion in frame

relay networks; and Router/Switch Health, which reports on CPU utilization, buffer handling, fault monitoring and volume by protocol. WebLink, a Web-based reporting facility, supports the full line.

One Concord customer, Arizona State University, has 17,000 connections over its main and remote campuses, totaling 80 to 90 individual customers. Concord's tools have allowed Joe Askins, director of data communications for ASU, to centralize management operations and maintain a lean staff.

Utilization statistics provide Askins with ammunition when he enters negotiations with his customers. "It is invaluable to look at variances from baselines and customer monthly profiles," he says. Un-

### **Evaluation Criteria for Proactive Management Tools**

Proactive management is not about building a better pair of binoculars, it's about learning where to point the ones you already own and how to find points of interest on the horizon.

There is no way IS staffs can continue to meet the escalating requirements of all their constituencies — business management, users and customers — without moving toward a proactive management model. By addressing future availability and performance requirements, proactive management enables IS staffs to break out of a "firefighting" posture and focus on issues pertaining to business competitiveness.

In evaluating network management tools, administrators must fully examine the level of proactive functions a product offers by asking three questions:

 Does the tool provide information on devices or processes functioning normally, i.e., not experiencing a fault or poor performance?

- Does the analysis include historical performance data?
- Does this information offer predictive or preventive value for device or process performance?

Any "no" answer suggests the product does not offer full proactive management features. Tools must be able to analyze devices under normal conditions so as to allow administrators to understand baseline performance. If there is no historical data in the analysis, the tool cannot understand performance trends. And the information provided must allow an administrator to improve or ensure future performance.

To determine the effectiveness of a proactive management tool, product evaluators must ask:

- Does the output from the tool point to a specific action?
- If not, how much additional analysis must be conducted to arrive at an actionable conclusion?

**Exception reporting illustrates** this point best. An exception report

identifies a specific area in need of attention. If you read the report and know precisely what to do — work on device X — this is actionable information. If the summary report or performance analysis does not offer an immediate conclusion, how much additional analysis must be performed? If the administrator has to rely on other tools before taking action to solve the problem, the product is not a particularly effective proactive management tool.

But the ability of administrators to incorporate proactive tools into their management practices will be the ultimate measure of even the best tools. Good products will certainly find uses in IS staffs, but to maximize the value of these products, decision makers must look closely at how proactive tools can improve their internal network management practices based on the information the tools provide. Only then will IS realize the full value of proactive management tools.

derstanding his own environment intimately helps him isolate performance problems and in many cases offer "just-in-time" capacity. With Network Health statistics, he knows when his customers' segments are reaching high utilization, and can offer them a higher level of service before their performance is degraded. He also helps customers understand their own bandwidth requirements: Many insist they need a T1 until they see utilization data which shows a 56K frame relay link will do the trick.

Utilization information also comes in handy when Askins has to fend off the sales pitches of hardware vendors or WAN service providers looking to improve bandwidth unnecessarily. By knowing the precise load on each segment, he has been able to put off major expenditures by delaying ATM deployment and a fiber installation project.

### Simulation and modeling

Simulation and modeling tools may be the ultimate form of proactive management. Products that enable administrators to test scenarios — from the installation of network hardware to simulating the impact of networked applications — can tell them how such activities might affect the environment. Without such tools, IS managers deploy applications from the isolation of the lab to the real-world full production network with little idea how network performance will be affected. Current simulation and modeling tools cannot entirely do away with guesswork, but they certainly reduce the anxiety that often accompanies major changes to a network.

There are two ways to simulate or model network performance. Building a model of the network infrastructure and traffic and introducing new elements under different what-if scenarios is the approach of firms like CACI International, Arlington, Va., Make Systems Inc., Mountain View; Optimal Networks; and Scientific and Engineering Software, in Austin. The second technique — simulating traffic over the production network itself and getting an "actual" measure of how the application affects the network — is the approach of Ganymede Software.

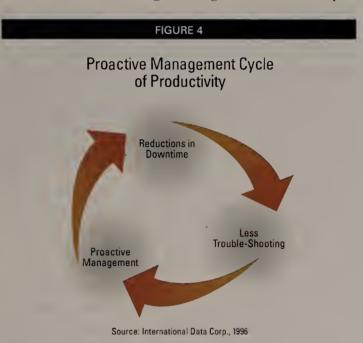
Optimal Networks targets network design and optimization processes. Its software allows users to build a model of their network, using actual traffic and topology data, on which they can test potential

configuration changes or deployment strategies.

The firm's Tool Kit line consists of three applications: Optimal Surveyor, which discovers network topology and traffic flows; Optimal Internet Monitor, which reports on Internet application traffic; and Optimal Performance, which models network topology and traffic, displays allocation of application traffic, and supports what-if capabilities to test design or flow changes.

Community Care Network, a health care company in San Diego, has 1,000 users at 20 sites using a FDDI backbone and frame relay WAN services. When the company decided to overhaul its network, the redesign included rolling out a new database application (over a NetWare network) that had to support access to many remote sites over the WAN.

Lead network designer Eligio Rollo used Opti-



mal's Network Tool Kit to model the effects of the application rollout and perform what-if analyses to determine the most beneficial deployment. What he discovered was no shock: Users accessing the database over the WAN experienced poor performance.

The first solution tested — deployment of more servers at remote sites to support local users — worked fine in simulation, but was expensive, given the upfront hardware costs as well as ongoing maintenance of remote servers. Rollo then used the Tool Kit to create a simulation to test deploying a second centralized server that would allow local users to ac-



### The Search is on for Internet Management Tools

Companies deploying Internets and intranets are starting to find not only internal abuses but also external ones, such as outsiders gaining access to internal files or clogging corporate networks with useless traffic. "The need for intranet-specific management tools has become critical," says Frank Moss, president and CEO of Tivoli Systems, an IBM subsidiary in Austin, Texas.

In response, systems management vendors are starting to add Web management tools to their lineups. Tivoli is shipping Tivoli/net.Commander, which allows users to directly manage not only their intranet applications, but also the underlying Internet "platform" of Web, news, mail and other services. The product is part of the Tivoli Management Environment (TME) family of products.

The company is also working with net.Genesis, a Cambridge, Mass., supplier of Internet tools, to offer Tivoli/Plus for net.Analysis. This product integrates net.Analysis, a tool that analyzes Web server content usage, with TME, thereby providing IS managers with a level of functionality similar to current systems management for LANs.

Computer Associates has enhanced its CA-Unicenter systems management product with the ability to manage Web servers for the intranet or Internet. According to Yogesh Gupta, senior vice president of product strategy, "Once Web servers started being used in intranet environments for real business aplications, the question became, what will people do for operational man-

agement?" The company has since integrated products from Microsoft, Netscape Communications, Open Market Corp. and Spyglass Inc.

BMC Software in Houston has added Internet and intranet monitoring to its Patrol suite with Patrol-Watch for Web Browsers and Knowledge Module for Internet servers. Compuware Corp., Farmington Hills, Mich., has added Internet and intranet server management features to its EcoTools line of network applications management tools.

WireTap, a performance management tool from Platinum Technology, in Oakbrook Terrace, III., can now also be used to monitor traffic to and from corporate intranets and Internet and Web servers. Like a network sniffer, the tool examines network utilization by network protocol, application and other traffic categories, and provides response time and occurrence statistics for service requests, such as intranet and Web pages.

OpenVision, in Pleasanton, Calif., has a slightly different take. According to director of product marketing Steve Foote, the company hasn't had to modify its AXXiON systems management products "one iota" for the Internet. "The same systems management products you've been using for your mission-critical applications can now be used with Internet servers," he said. "It's just a matter of performing basic systems management on your Web site."

AXXION, said Foote, has three Internet management thrusts: storage, availability and security.

Some firms have started backing up their Web sites by employing hierarchical storage management (HSM). "Now that Web sites are using very large image files and sound files, companies are using HSM to reduce overall storage requirements for Web sites by offloading "cold" files to secondary storage. This also increases the overall efficiency of the network, Foote noted.

The issue of availability is becoming critical as more Web sites are used for distribution and selling. Once a revenue stream becomes Web-server dependent, companies lose revenue if their customers cannot get FTPs off their Web servers.

Security has become the #1 issue for Internet management. "A Net server might be hit 100,000 times a day," says Foote. "So a company wants to make sure that the information on its Web site is intact.

"You have to be careful about the security of systems management," he warned, noting that many event managers use the "highly insecure" SNMP protocol. "It's easy to spoof access with SNMP," he noted.

Another problem: When the risk assessment space of systems management is used for security analysis, the information is often left in a text file on the server. Since the HTTP process has root privileges, someone searching a term such as "security weakness" on a Web crawl can find audit reports. In one month, Foote found 124 audit reports on the Web. "It's like companies are saying, 'Here's a list of how to break into my Internet server'."



cess the database over TCP/IP. This solution provided adequate performance to remote users — at far less cost. By using a modeling tool, Rollo was able to examine several deployment strategies and choose the least costly solution knowing it would function up to his company's performance requirements.

### Task-specific products

Although products in this category might fall into the reporting or modeling disciplines, vendors in this space first identify a management problem, then decide what types of data will be required to address the problem. Next, they develop a means of

collecting and processing the specific pieces of data which will solve the problem (by definition, a proprietary mechanism). The result: a solution-oriented product that leverages a new form of data collection and processing.

EcoNet from Compuware focuses on the problem of limited visibility into application performance across networks. CoroNet Systems (a firm bought by Compuware last year) developed a way to measure application traffic loads and response times by piecing together information from static ports, SAP analysis, open

file requests, pattern recognition and address maps. By providing this view into application traffic, EcoNet helps identify congestion points and balance application loads across customer environments.

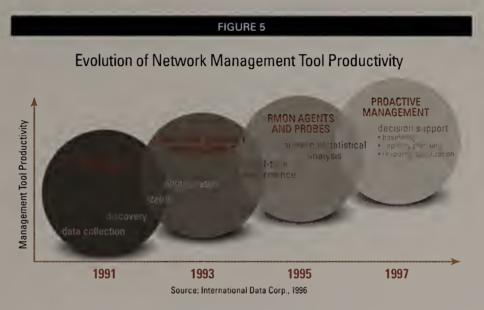
NetSys Technologies takes a task-specific approach with two applications for router configuration. Connectivity Tools generates a topology model of a routed network by modeling routing algorithms and taping information in routing tables in order to identify configuration errors and build a baseline of routed traffic. Performance Tools performs traffic analysis and what-if scenarios on top of Connectivity Tools by analyzing the interaction between application traffic and network configuration.

The NetSys tools have come in handy for Francois Negri, systems and network management engineer at Instinet, a financial services firm in New York City. Instinct is migrating its asynchronous

dial-in network to TCP/IP over a routed network. The challenge for Negri is this: He has to build a network that is your company's only vehicle of revenue generation; provide services to 2,500 sites worldwide; and configure the 6,000 routers required to make this happen.

Verifying router configurations is a labor-intensive — and highly sensitive — part of the project. Router configurations must be rigorously tested to avoid any future downtime. The problem is exacerbated because, as Negri points out, "access lists can be invalidated by one wrong character."

To ease the configuration process, Instinet uses



NetSys products. Connectivity Tools not only sped up the process of verifying router configurations for the new network, it also brought to light configuration errors that the Instinet staff would not have caught. Being able to identify router configuration errors before a network goes live will save Instinet's IS staff countless hours down the road in fault identification, not to mention what it saves the firm by preventing downtime.

Performance Tools let Instinet assess capacity requirements and identify areas where less expensive hardware would perform adequately. In many instances, Negri found that a Cisco 4500 router could replace the Cisco 7500 originally called for.

To have done the Instinet project without the NetSys tools "would have [been] ten times harder," says Negri. NetSys "eliminated the trial and error basis [of router configuration]."





NOBODY HAS SEEN CLIENT/SERVER BACKUP THIS FAST BEFORE. into high gear. Suddenly, yesterday's

Client/server deployment has shifted

performance scale no longer applies.

### INTRODUCING

Take backup, for instance. Yester-

### 2000% FASTER

day, 25 GB/hr. was called high

### ENTERPRISE

performance. Today, OpenVision

### BACKUP:

AXXiON-NetBackup delivers at 500

### 500 GIGABYTES

GB/hr. Hot, warm or cold. All cen-

#### PER HOUR

trally managed and intelligently

automated to protect multi-terabytes

of distributed data overnight. That's

the kind of performance you need to

safely move large-scale, complex

applications to client/server. For

information on AXXiON-NetBackup

or the location of a high-perfor-

mance storage seminar near you,

call 800-223-OPEN.



### Servers & PCs

Large Systems + Workstations + Portable Computing

### High-end server team

Carrera Computers, Inc. in Laguna Hills, Calif., and Aspen Systems, Inc. in Wheat Ridge, Colo., have teamed up to create a workstation/server that runs on two 500-MHz Alpha 21164 processors from Digital Equipment Corp. The Cobra II targets scientific and engineering users who need high performance.

### Modem protection

Best Power in Necedah, Wis., has introduced uninterruptible power supply systems that protect workstation modem connections to the World Wide Web. Best Power's Patriot Plus 650VA and 920VA models were designed to protect computers connected to the Internet via modem from lightning and other power surges.

### All 'net, all the time

IBM has announced new Internet server packages based on the RS/6000 platform running AIX 4.2. The Cluster Internet Powersolutions servers bundle IBM's High Availability Multiprocessing Clustered software and ready-to-run Internet applications options, including online stock brokering and mail catalog ordering.

### Platform overhauls need careful planning

By Jaikumar Vijayan

CORPORATIONS THAT plan to pull the plug on their midrange server platforms and replace them entirely with newer technologies may run a high risk of failure in the next few years.

If the migration isn't carefully planned, and if all options to system replacement aren't considered, users could end up with more costly and less manageable systems, according to a recent Gartner Group, Inc. report Platform overhauls, page 51

### PLATFORM MIGRATION STRATEGIES

#### Method

- Maintain (avoid or delay change)
- Refurbish (re-engineer/ modernize)
- Consolidate (reduce the variety)
- Surround (add/partially replace)
- Replace (replace all systems)

Source: Gartner Group, Inc., Stamford, Conn.

### Risk

- Inflexibility, expense of old technology
- Some technologies incapable of evolving
- May force different workloads together
- Makes the environment less manageable
- Makes a fallback alternative difficult

### Forget bells, whistles. We want battery life!



"Everyone is convinced there is a worldwide conspiracy not to give us enough battery life."

– Asmar Madyun, technical support manager, AT&T

### ► Laptop survey shows users want the basics

By Mindy Blodgett

THE LAPTOP INDUSTRY has been pushing faster chip speeds and advanced features such as active-matrix color screens, but users are unhappy about the lack of simple features such as long battery life.

That is according to a recent survey of 2,000 users in the U.S. and Europe by H&M Consulting, Inc. in Sunnyvale, Calif.

The survey said 77% of users reported battery life of less than two hours on a single charge a woefully inadequate amount of runtime, according to users.

"It's gotten to a point where I think everyone is convinced there is a worldwide conspiracy Battery life, page 50

### **Studies** knock NC hype

By April Jacobs

AT LEAST TWO industry analysts are erring on the side of caution when it comes to the network computer; they say they aren't convinced it is a viable replacement for the PC.

Two new studies - one by Zona Research, Inc. in Redwood City, Calif., and the other by Q.E.D., Inc. in White Plains, N.Y. - indicate that the network computer will serve as a replacement for terminal-based

Studies, page 50

#### SUDDENLY, STANDARDS NECESSITY. EUROPEAN ARE GORGEOUS

If your require a 17" monitor for your media-intensive applications, don't just settle for a bigger system. Acquire a better ane. A media-ready Nokia 447X

These are the first monitars in the world to achieve the new

VESA standards for display clarity. Their spaciaus 15.7" viewing area baasts an aperture grill of .25 mm and refresh rates of 150 Hz. They are capable of  $1600 \times 1200$ resalution, which translates directly to improved working conditions and user-sensitivity. They are also the first to be TCO-95 certified for greatly reduced screen emissions

What's mare, dual-powered stereo speakers in front combine with a subwoofer in the swivel/tit base to project audio that is properly shaped and sensational Combined with its standard in-bezel microphone, the media-ready series enables a complete convergence of computing and communications, which makes the new 447X series a necessity for anyone making full use of their computer

To meet today's standards, work with the people who

Visit us at www.nokia-americas.com ar call 1.800.BY.NOKIA and ask for Dept. N212



447Xi—High-resolution display ideal for graphics-intensive opplications





447Xovc-Adds to X series features



coins are continuously supported. Size of CTT measured deaggrouply. A text intervent part is alleghtly less librorier and conspired in Federal in an ISO 1907 captived environment. ISO 1994 Navic Depote products, less I Mail Sympos. Products, less I Mail Sympos established comment of the product in service. All other inscirents are the soil property of their inscirents.



















### Studies knock net computer hype

CONTINUED FROM PAGE 49

systems, not PCs.

Both research firms say one of the major stumbling blocks for network computers will be a narrow selection of applications available compared with PCs.

Because network computers don't have local storage, users will be able to access only applications that are available on servers or mainframes.

"It's certainly not for everybody," said Greg Blatnik, vice president of Zona Research. He said the network computer is still in its infancy and may mature into forms that make it more attractive to compete with the PC.

Only about one-third of the respondents of 55 sites interviewed in Zona's study said they found the network computer appropriate for their users.

Blatnik said respondents either were attracted to the idea of the network computer for its easier and less costly adminis-

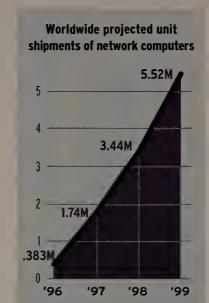
tration than today's PCs, or they were turned off by limited functionality and dependence on networks and servers for opera-

Both studies concluded that the network computer's best use now is in replacing terminals.

O.E.D. determined that with 10.5 million terminals currently installed, network computers should have a good market to fill, according to Mirek Stevenson, the company's chairman.

"The [network computer] is a good upgrade for the nonprogrammable terminal, but it doesn't give the flexibility of a PC," Stevenson said.

Q.E.D., which polled 3,000 consumers and 1,000 corporations for its study, found that in industries such as retail and wholesale distribution, health care and professional services, interest in network computers was lower - and so was the installed base of terminals.



Source: Zona Research, Inc., Redwood City, Callf.

In other segments such as discrete manufacturing, where terminal-based systems are popular and single applications for functions such as data entry and customer service are needed on a large scale, network computers may be more appropriate, the study said.

### **Battery life wanted for laptops**

CONTINUED FROM PAGE 49

not to give us enough battery life," said Asmar Madyun, technical support manager at the network services division of AT&T Corp. in Berkleley, N.J. "I just don't believe that the technology isn't there to deal with this problem."

Laptop vendors say the faster chips and advances such as multimedia applications sap notebooks of battery life - but they continue to release more powerful machines, such as the recent spate of 150-MHz Pentium portables. Vendors are expected to release 166-MHz Pentium notebooks next year.

Battery vendors, meanwhile, are working on new technology that lengthens use, but products aren't expected until late next year [CW, Oct. 21].

"A battery that would last four or more hours would be great," said Steven Wittner, information systems manager at Centex Construction Co. in Dallas.

Also in the survey, 56% of

those asked cited software installation and support complexity as being among the greatest barriers to greater usage of their portables, and 44% cited hardware/software incom-

When asked to list their main complaints about portables, 29% said their notebooks were difficult to use and another 21% said they had problems with their machines that they didn't expect. For instance, Mark Macgillivray, an analyst at H&M, said many users complained about not being able to get CD-ROMs to work. A lack of wireless communications support also frustrated many users.

"In general, users didn't feel that the cost of the machines was justified by the functionality," Macgillivray said. "We hear a lot from the industry about things like voice recognition and high speed, but the bottom line is that people want these things to be easy to use."

### David.





### PORTÉGÉ 660CDT

- 11.3" dia. color active-mati display, 800 x 600 screen
- 150MHz (2.9v) Pentium® Processor
- · PCI bus architecture
- 1.4 billion byte (= 1.35GB) HOO
- 16MB EOO ORAM (expandable to 80MB) with 256KB level 2 cache
- Built-in, cellular-ready 28.8Kbps
- 10X\* CD-ROM
- 12mm slimline SelectBay for
  - CO-ROM, floppy drive or optional second lithium ion battery
- 16-bit Sound Blaster® Pro compatible with stereo speakers and microphone
- Supports two Type II or one Type III 16-bit PC Cards, ZV Cards or 32-bit CardBus Cards
- · Lithium Ion battery
- Enhanced 84-key keyboard
- Optional Oesk Station V Plus docking station or Optional NoteDock™ II Enhanced Port Replicator
- Windows® 95 or Windows for Workgroups
- · 3-year limited warranty · Toll-free technical support ·



### Platform overhauls need planning

CONTINUED FROM PAGE 49

on server consolidation and migration strategies.

A gradual, step-by-step approach to replacing older hardware and applications

— unless system functionality or management issues re-

quire immediate action — could prove to be much safer and cheaper, the Gartner report said.

Some companies are following the slow, steady track. "We don't want to simply chuck our legacy system out and go to Windows NT. We would like to work with both" in the short term, at least, said Nancy Estep, a systems coordinator at Security Forces, Inc. in Charlotte, N.C.

The company is considering moving some of its customized applications off its legacy Data General Corp. minicomputer to an NT environment. Although the new systems will bring in added functionality and packaged software, the older DG system will continue to provide benefits such as substantial storage capacity, Estep said.

According to Gartner, examples of total system re-PLATFORM

placement include MIGRATION moving from mainframes to Unix or from proprietary systems to

Unix or Windows NT. An application replacement involves migrating from customized software to packaged environments such as SAP AG's R/3 suite.

In fact, depending on the kinds of issues forcing the migration, users may be better off considering other options to total replacement, according to Gartner.

#### **SURROUND STRATEGY**

For instance, if users need additional processing power for a new application — and if interoperability with legacy systems is achievable — they could consider "surrounding" their existing servers with newer servers, Gartner said.

Similarly, corporations that seek to migrate to new technologies because of pressing management issues, such as the costs of keeping legacy systems up and running, may want to consider systems consolidation options. That approach reduces the variety of existing systems and makes centralized management easier, the report said.

"Every single system vendor is trying to integrate" new technologies into its installed base, said Dan Kuznetsky, an analyst at International Data Corp. in Framingham, Mass.

"But the larger the current base is, the harder it is for them to bring in new technologies without breaking something, somewhere," Kuznetsky added. Integrating all the pieces and making it work in an enterprise will require extensive groundwork and planning, he said.

### New storage for LANs, WANs

By Matt Hamblen

IMPACTDATA is offering a group of new storage hardware and software products for large network users that the company said will give access to data across many computing platforms as fast as the speed of a network.

Called the Distributed Storage Node Architecture (DSNA) by Impactdata, a division of Datatape, Inc. in Monrovia, Calif., the technology includes a network server, tape drive and DSNA software designed to enable an application anywhere on a LAN or WAN to access and use data as if it were stored locally. Impactdata's Network Peripheral Adapter, a controller and file server, was designed to serve as the cornerstone of DSNA. Available in the first quarter next year, pricing will start at \$50,000.

One expected advantage of DSNA is that it can be configured with a choice of vendor

hardware, said Thomas M. Ruwart, assistant director of the laboratory for computational science and engineering at the University of Minnesota in Minneapolis.

"It's ease of use has enticed us," Ruwart said. Users can "integrate the DSNA into their current environments, thus maintaining their original capital investment in archiving hardware and media," he added.

Ruwart plans to evaluate DSNA products with the university's existing tape subsystems from Ampex Corp. in Redwood City, Calif. In addition to its tape storage, the university has to manage about 750G bytes of data stored on disk.

Officials at Impactdata said a typical user of DSNA will have at least 100G bytes of online storage and produce large amounts of data that need to be stored and retrieved at high speeds on distributed networks. DSNA software and hardware will be available early next year.

# And Goliath.



INTRODUCING THE POWERFUL PORTEGE.

Better isn't always bigger. Take the new lightweight Portégé 660CDT with a

150MHz Pentium Processor, a 1.35GB hard drive and a built-in slimline SelectBay™ that allows you to swap a CD-ROM, floppy disk drive or perhaps an additional battery. It's Toshiba's ultimate in flexibility

OSHIB

and usability from the award-winning Portégé line. For more In Touch with Tomorrow

information, visit the Toshiba website at http://computers.toshiba.com, or for a dealer near you, call 1-800-457-7777.



### THE WORLD'S MOST AFFORDABLE BUSINESS CRITICAL INTERNET SERVER.

Without SCO® Internet FastStart, deploying Internet access across your enterprise is extremely expensive. FastStart gives you the power and reliability of a UNIX® system at a very low cost. And because it can be deployed on inexpensive Intel® processor-based servers, your hardware costs are lower, too.

FastStart lets you access, publish and conduct business on the Internet. And to share internal information via Intranets.

But it doesn't take a rocket scientist to install and maintain.

SCO Internet FastStart Includes:

- SCO OpenServer™ Enterprise
- Netscape Communications Server™
- Netscape Navigator™ 2.0
- Multi-line PPP and Multi-homing support
- Graphic Installation and Configuration Tool

Don't risk grounding your business with a more expensive, less reliable server solution. Call SCO today.



1-888-SCO-4YOU code IFQ396

www.sco.com/ad/IFQ396

### Software

Client/Server + Development + Operating Systems

### **MONEY MATTERS**

Software license fees are only the tip of the cost iceberg for companies that migrate to enterprise client/server applications. According to a Forrester Research poll, more than half the companies spent more than \$5 million to implement one application; 26% paid more than \$10 million.

What was the service-to-license ratio for your largest implementation project?

1 to 1	3%
2 to 1	15%
3 to 1	13%
4 to 1	10%
5 to 1	17%
More than 5 to 1	17%
Wouldn't say/ Didn't know	25%

Source: Forrester Research, Inc., Cambridge Mass.

Base: 40 companies

### Briefs

### Amdahl warehouses

Amdahl Corp. in Sunnyvale, Calif., last week announced plans to sell and support a data warehouse query engine developed by CrossZ Software in Mitchell Field, N.Y. Amdahl will market CrossZ's Query-Object System to corporate users, particularly in the telecommunications market, and to resellers and distributors. QueryObject condenses large data sets into objects that can be searched by end users equipped with PCs.

### **OLAP** on the Web

Information Advantage, Inc. in Minneapolis this week will announce plans to support ActiveX and drag-and-drop development to make it easier to customize its DecisionSuite online analytical processing tools. Visual design of add-in modules should be possible by next April, the company said. Its front-end software will then be rewritten as ActiveX components next summer, with support for both PCs and World Wide Web browsers. The plans are part of a new DecisionSuite Framework that will be detailed this week.

• Decision-support software being tailored to specific markets

### Vendors go vertical

By Craig Stedman

ARMED WITH promises of speedier implementations, some decision-support vendors have started tailoring their software to specific vertical markets. But prospective users' reactions have been mixed about that approach

The vertical button has been pushed hardest by Comshare, Inc., which this week will announce a new version of its Commander FDC financial reporting software aimed at manufacturers. The Ann Arbor, Mich., company began vertically customizing all its tools in the past nine months.

Others are following the same path. For example, Platinum Technology, Inc. in Oakbrook Terrace, Ill., introduced a decision-support development package for insurance companies earlier this year. VMark Software, Inc. in Westboro, Mass., is aiming data mart tools that it announced in November at ver-

tical-oriented resellers. And Oracle Corp. is looking at tailoring upcoming data mart packages for specific industries, though it hasn't committed itself.

The idea is to give customers

### VERTICAL MARKET USES FOR WARE-HOUSED DATA

- Finance Finding consumers who will be good marketing targets
- Health care Controlling patient costs in managed-care programs
- Retail -Tailoring promotions to narrower customer bases

Source: International Data Corp., Framingham, Mass.

in markets such as finance, retail and health care a user interface that already speaks their language and can be put into production with less tinkering and adaptation than generalpurpose tools require. Some users said that could potentially save time and make their lives less stressful.

#### MONTHS OF IMPLEMENTATION

Giddings & Lewis, Inc. spent almost two months implementing Commander FDC several years ago, even with two consultants from Comshare on hand. "If there were [manufacturing-oriented] templates that you could take and go forward with, that would make it a lot easier," said Terri Groth, accounting manager at the machine tool maker in Fond du Lac, Wis.

Raja Kochar, a consultant who develops decision-support applications for consumer goods companies, said tailored market planning software that Comshare introduced this year would have let him complete a beverage-related project in less than 60 days. It took nine Vertical, page 58

### Microsoft's Java compiler plans unclear

By Sharon Gaudin

MICROSOFT CORP. says it is trying to make Java run faster and better on Windows.

But even Microsoft officials seem unsure how they will do that.

The company has improved its implementation of the Java Virtual Machine, which lets Java applications run on Windows. It also has released class libraries

- Dave Kelly, Hurwitz Group

"There are enough

platform-specific

languages around."

that will add Windows functions to Java applications.

But statements from Microsoft officials differ widely on the question of whether the company is working on a native code compiler for Sun Microsystems, Inc. Java that will turn Java Microsoft, page 58

### Software metering tools save users money

By Patrick Dryden

SAVVY INFORMATION systems managers rely on software metering tools to monitor peak usage of commercial software titles when they have to keep an eye on budgets and unruly users.

Software metering, page 54

### Licensing lessons

▶ Users question vendors' current methods

By Lisa Picarille

DESPITE RECENT overhauls in licensing policies from vendors such as Microsoft Corp., some users question whether current software licensing methods are a bargain or a boondoggle.

Although licensing options and pricing vary widely among software providers, some users claim it is often hard to determine which vendor will give you the best deal or what exactly you are buying.

"It has gotten out of hand. Licensing is way too complicated," said John Nelson, manager of technical

support at Denver Water in Denver, which has more than 750 users and "at least a half-dozen people dealing with licensing in one way or another."

Nelson suggested maybe a **Licensing,** page 54

### COMING TO TERMS

- Site license: All users at designated company or location access the software
- Network license: A designated number of specific users access the software from a server
- Concurrent: A specific number of users access the software simultaneously from a server
- Individual: A user installs the software on a single machine for his own use



### Eicon updates mainframe-to-PC software

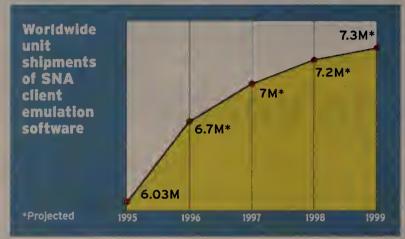
By Tim Ouellette

EICON TECHNOLOGY CORP. is shipping new host access software that promises to mask mainframe complexity from users and network administrators.

Aviva Mainframe Edition 7.2 adds support for Microsoft Corp.'s Windows NT 4.0, Object Linking and Embedding 2.0 and ActiveX.

This lets users access mainframe data from the safety of their familiar business applications, such as a spreadsheet.

"We found out when moving to Windows NT 4.0 that our previous emulation program would not support the platform," said Brian Lash, a technical consultant at a major airline



Source: International Data Corp., Framingham, Mass.

in the Midwest.

"We are using Aviva to have one of our mission-critical applications, which lets controllers assign aircraft to various flights, communicate directly with the mainframe," Lash said. "It's a

juggling act."

Aviva also includes desktopbased Data Link Switching (DLSw), a technology that carries SNA data packets over TCP/IP networks. Although DLSw is common, it requires

DLSw-compatible routers on both ends.

Eicon simplifies this by requiring only a TCP/IP stack on the PC, eliminating setup and maintenance tasks for administrators. Thus remote users don't need to go through separate gateways.

#### **MORE UPGRADES**

With big iron shops interested in opening up mainframes to more and more users inside and outside the company [CW, Nov. 4], users can expect continued upgrades of this type in the terminal emulation markets. And although Web browser access to mainframes is considered the next big thing, one observer says traditional emulation will see solid demand in the near future.

"There is still a healthy appetite out there for terminal emulation. Mainframes aren't going away," said Eric Hindin, an analyst at The Yankee Group in Bos-

Hindin added that Aviva is as well-rounded as any of its competitors in the host access market. Competitors to Montrealbased Eicon include market leader Attachmate Corp. in Bellevue, Wash., Wall Data, Inc. and IBM.

Other new features in the \$295 Aviva 7.2 package include support for Novell, Inc.'s SNA access product, NetWare for SAA 2.2, and a mainframe print job control module. This supports Windows NT print services and avoids the requirement for a separate host print management server.

### Software metering tools save money

CONTINUED FROM PAGE

They can save money by buying only as many copies as their users need. And they can assure vendors and watchdogs such as the Software Publishers Association (SPA) that they run only what they bought.

Managers also report that metering tools help track users' activity and control such problems as games and unauthorized browser versions.

Many corporations have launched initiatives "to get legal and keep it that way through policies and monitoring," said Kathrin Winkler, senior consultant at The Registry, Inc., a network consultancy in Newton, Mass. "Software metering is part of the overall attempt to control desktop computers and lower the overall cost.'

Managers at Lexis-Nexis estimated concurrent usage much too high when they negotiated group licenses for standard applications needed by 900 users at the company's headquarters in Miamisburg, Ohio, said Eric Snell, a systems software engineer at the information pro-

Today, more than 2,000 users share the same applications with only a slight increase in the number of licenses, Snell said. Lexis-Nexis used the Express Meter tool from WRQ, Inc. in Seattle to accurately track peak

"Without metering, we would have had to double our licenses when our user population doubled," Snell said.

Engineering and architecture

firm SSOE, Inc. adopted Sof-Track from On Technology Corp. in Cambridge, Mass., when Microsoft Corp. began offering concurrent licenses to organizations that could track usage, said David Lee, senior systems analyst at SSOE in Toledo, Ohio.

"Purchasing Microsoft Office for 300 PCs is very expensive when many stations will run design software most of the time," Lee said. "We saved a huge amount by knowing how many users run a package at any

### **EASY ENFORCEMENT**

The metering function built in to Intel Corp.'s LANDesk Management Suite and other products makes enforcing license restrictions easy, said Tim Munn, computer services director at the School of Pharmacy at the University of Maryland in Balti-

Munn had previously tried to configure access privileges on a Novell, Inc. NetWare network to limit which applications more than 300 users could reach. "That wasn't ideal because we had to make so many changes and tell users they couldn't have access to certain applications, Munn said. "Now control isn't a

Metering helps Smith Technology Corp. in Philadelphia "stay legal without overpurchasing," said Diane DelVecchio, a systems engineer at the company. Because the environmental services company recognizes the "audit potential" from vendors and the SPA, she said, it supervises 900 users at 25 sites with the SaberLAN Workstation suite from McAfee Associates, Inc. in Santa Clara, Calif.

"All it takes is one complaint to put you in turmoil," DelVecchio said. "Even if you're in compliance, you still have to pull all your paperwork. Metering not only helps you comply with your license, but lets you track all the serial numbers."

Similar fears inspired the adoption of Hanover, N.H.based Tally Systems Corp.'s CentaMeter at Central Vermont Public Service Corp.

"The biggest reason we meter is in case a disgruntled employee tells on us," said Tracy Adams, technical services manager at the Rutland, Vt., utility. "We may not be 100% in compliance with our licenses, but metering shows our honest effort."

### SIDE BENEFITS

As administrators apply metering tools to control software costs and license compliance, they discover other management benefits. Several managers said they listed game titles in the meter's library for monitoring, then set usage level to zero or allowed games to run only at certain times.

"Besides restricting games, we needed to back up our Internet usage policy by blocking browsers," said Ken Newton, network systems technician at Corning Revereware, Inc. in Clinton, Ill.

### **Licensing lessons**

new licensing model is needed. "Maybe some sort of simple but standard agreement would eliminate all the hassles," Nelson said. "But that isn't likely to happen."

One industry analyst agreed. Jeff Tarter, editor of "Softletter," an industry newsletter in Water-

town, Mass., said that because vendors make the bulk of their revenue on licensing, they will never make it easy to compare prices.

"It is like a car salesman and car buyers. The car salesman sells a car

three times a day. But the buyer maybe purchases one car every three years. So who do you think is in a better position to take advantage of the other?" Tarter asked.

### **COMPLEX AGREEMENTS**

Most software companies said agreements can seem complicated because they are offering customers more licensing options than ever.

And every new vendor agreement adds one more layer of complexity to a corporate licensing picture, one user said.

'We are ruthless about keeping down the number of software companies we deal with to about 20 major vendors," said John Parkinson, chief technolo-

gist at Ernst & Young in Los Calinas, Texas.

#### **OPTIONS LOST**

"The first [vendor] that

caves in and moves to a

pay-by-use strategy will

clean up because that is

what the users want."

- John Parkinson,

**Ernst & Young** 

Parkinson said that because Ernst & Young's more than 20,000 mobile users must have the software installed on their hard disks, they aren't able to

take advantage of cost saving concurrent licensing options.

Parkinson said he would like to see a licensing scheme where local metering software is installed on each mobile system and then syn-

chronized with network-based records to determine what applications were used and for how long. That data would ultimately determine how much Ernst & Young would pay for using the

"The first [vendor] that caves in and moves to a pay-by-use strategy will clean up because that is what the users want," Parkinson said.

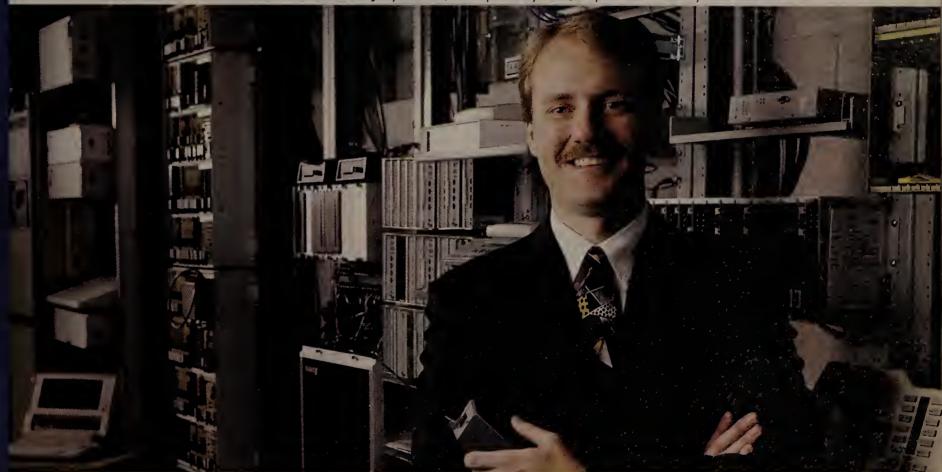
Tarter added that information systems managers are typically focused on the technology and that pricing issues, although just as important, are often sec-

"You don't get to become an IS manager by apprenticing as a purchasing agent," Tarter

# BUILDERS

# "HOW DID WE GET FAST, EASY REPORTING FROM OUR SAP R/3? WE CALLED THE BUILDERS."

Jerry Gleisner, VP Corporate Systems, Telephone and Data Systems



With mandatory reporting responsibilities for 350 separate companies, Telephone and Data Systems (TDS) boasts one of the most complex reporting environments anywhere. So when TDS decided to convert its mainframe financials and materials management systems to SAP™ R/3™ client/server applications, it needed an easy, cost-efficient way to generate complex reports without resorting to custom programming.

### A TENFOLD PRODUCTIVITY IMPROVEMENT

TDS came up with a great solution... SNAPpack™ Power Reporter™ from Information Builders. SNAPpack Power Reporter makes it easy for TDS users to create their own logical views of the R/3 data using everyday business

terminology. All TDS users have to do to generate a report is point and click on English field names from SAP's own data dictionaries. Best of all, SNAPpack Power Reporter utilizes Information Builders' FOCUS Reporter for Windows, a user-friendly reporting environment powerful enough to handle even the most complex financial reports and consolidations from data resident in both SAP and non-SAP systems. The result... tenfold productivity gains, easy access to information and an empowered user community.

### **CALL THE BUILDERS**

For more information on SNAPpack Power Reporter, SNAPpack Audit, and SNAPpack Data Warehouse solutions for SAP, call The Builders at 800-969-INFO.

http://www.ibi.com

800-969-INFO In Canada Call 416-364-2760



**DEVELOPMENT TOOLS** 

### IBM has Visual Basic in its sights

By Howard Millman

MICROSOFT CORP. Visual Basic must prepare itself; it's about to take some heat from a formidable new contender — IBM's Visual Age for Basic.

IBM's entry in the Basic market appears — at least from a pure technology viewpoint — well-equipped to chip away at Microsoft's Visual Basic leadership role. It can do that by providing an integrated development environment that is syntax-compatible with Visual Basic, fully object-oriented and crossplatform. And if that description doesn't include enough buzzwords, Visual Age for Basic transparently supports System Object Model objects, OpenDoc components in OS/2 and OLE objects.

#### **TEST RUN**

While testing a late beta release of Version I.O, I easily and quickly developed several small applications using the product's three primary components: a forms builder/editor, a project window and a tool box of visual objects.

My development efforts followed the

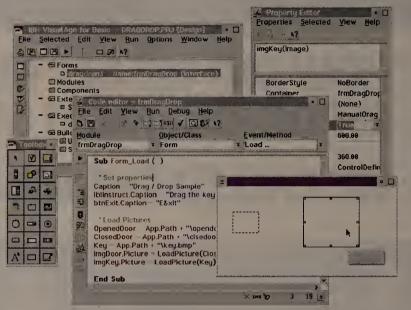
usual route — design the user interface, specify the behavior and functionality of the application and provide data access. The graphical user interface, built with the forms designer, serves as the foundation for all user-built applications.

Users populate it with objects and components (IBM calls them parts), such as command buttons, text boxes and option boxes, selected from the Toolbox.

Developers can satisfy the artist within by resizing, relocating and redesigning the components. The Property Editor sets the attributes of the forms and their embedded compo-

nents, including descriptive names, colors and fonts. An integrated Menu Editor conveniently embeds pull-down or popup menus.

The Code Editor lets users associate behavior with the form's components. A



IBM's Visual Age for Basic delivers everything you've really wanted in Microsoft's Visual Basic

staple of visual development environments, this type of event-driven programming simplifies embedding function

calls and procedures such as those used to invoke dynamic SQL statements. To change a component's associated procedure, a double-click calls a template for the procedure. The Code Editor's syntax checker will detect spelling and other clerical-type

When I keyed in syntax errors
— something I

find very easy to do — the integrated debugger immediately detected the offenders. As with most Basic products, the finished applications are interpreted, not compiled.

### SUITABLE SCALABILITY

Although the product's dual nature readily lends itself to building simple applications, it would be overkill to use it to develop a postage stamp catalog.

During my test drive, I developed a healthy regard for the product's power. Its modular, object-oriented architecture should enable it to scale for developing larger applications to run in traditional client/server environments.

In addition, IBM adds functionality to its Visual Age for Basic by fully embracing all the tenets of object programming.

For example, it lets users design, import or export their own classes, and it enables communication with hosts and databases. One of the back-end databases it

connects with is IBM's DB2.

Although it will connect to a variety of other databases through Open Database

Connectivity, it supports server-side stored procedures only for DB<sub>2</sub>.

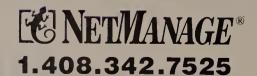
But if you intend to swim in this pond, heed this note of caution: You will need prior familiarity with object-oriented programming concepts and techniques. To help you flatten the learning curve, Visual Age for Basic's online docu-

mentation is intelligently organized and comprehensive. It includes tutorials to guide you through its many features and serves as an entry- or midlevel introduction to Visual Basic programming.

Millman operates Data System Services Group, a networking and problem-solving consultancy in Croton, N.Y. He is coauthor of the forthcoming Netscape Server Bible from IDG Books. He can be reached at hmillman@mcimail.com.

### TN3270/5250/VT For Windows NT and 95. SNA and TCP/IP

Today!



IBM 3270 and 5250 emulation with TCP/IP and SNA transports included! 3270 emulation supports new TN3270E standard.

ASCII terminal emulation including VT340, VT420, Wyse 50/60, TVI 950/955 and ANSI.

1996 NetManage Inc.,10725 North De Anza Blvd., Cupertino, CA 95014 U.S.A. Fax (408) 257-6405, UK: +44 1483 B81800; Israel: +972 (0)4-8550234, Germany: +49 (0) 8165/9470-0; France: +33-1-47 72 08 08; Japan: +81 (0) 3-3221-8400.

Specifications subject to change without notice. All trademarks are properties of their respective companies.

### And in this corner

Although IBM's Visual Age for Basic is a worthy competitor to Microsoft's Visual Basic, they both face another contender: Java. A platform-independent, object-oriented, World Wide Web-centric computing environment, Java has substantially benefited from earlier object-oriented languages such as C++, Smalltalk and Objective C.

PRODUCT

REVIEW

**IBM Visual Age** 

for Basic

**IBM** 

Armonk, N.Y.

(800) 426-3333

www.ibm.com

For all of Visual Age for Basic's (and Visual Basic's) many advantages in building traditional client/server LAN applications, developers contemplating building large systems should consider the likelihood that their applications will have to run over the Internet and on intranets.

Under those circumstances, Java may prove to be a more suitable development environment. An IBM spokesman acknowledged that the company may have to add Web-centric features to future releases.

In its league, Visual Age for Basic is worthy of consideration for developing Basic applications and maintaining applications built with Visual Basic. Aside from Visual Basic controls, Visual Age for Basic will readily accept a port of Visual Basic code for applications that run on Windows platforms. Overall, the environment is well-conceived, efficient in execution and easy to use. — Howard Millman

### BUILDERS

### YES. SmartMart™ is what I need. Tell me more.

- Please send product brochure.
- ☐ Please send me a FREE white paper, "The Data Mart: a New Approach to Datawarehousing.
- Please have a sales rep call ASAP.

We will be evaluating Data Marts in:

☐ 1-3 months ☐ 3-6 months ☐ 6-12 months

NAME			
TITLE/DEPT.			
COMPANY			
ADDRESS			i
CITY	STATE	ZIP	-
( ) TELEPHONE	· <u>- · · · · · · · · · · · · · · · · · ·</u>		
EMAIL			

### **Information Builders**

CALL 800-969-INFO

In Canada call 416-364-2760

http://www.ibi.com

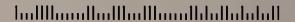
E-mail: info@ibi.com CW120996

### **BUSINESS REPLY MAIL**

FIRST CLASS MAIL PERMIT NO. 1305 NEW YORK, NY

POSTAGE WILL BE PAID BY ADDRESSEE

ATTN: Product Information Center Information Builders P.O. Box 1461 New York, NY 10117-1484 NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



# BUILDERS

# DATA MARTS COME DELIVERED IN A CHOICE OF BOXES... OURS OR PANDORA'S.



### MULTIPLE VENDORS... MULTIPLE HEADACHES

Today, many data warehouse projects become a "Pandora's Box" because they're built with tools from many vendors. Even the best tools can become a nightmare if they haven't been designed and tested to work with one another. And what happens when you have a problem? Your data warehouse vendors are experts only in their own environments. . . not in each others. The solution? A SmartMart<sup>™</sup> data mart from Information Builders.

### THINK SmartMart™... THE SMARTER DATA MART

SmartMart provides all the tools, technology and services you need to build, use, and manage a data mart... in one proven and affordable package. You get tools for data extraction and movement, transformation, multidimensional data storage,

reporting and analysis, Web access, and data mart administration. You'll also get the consulting services you'll need to guarantee a fast, trouble-free implementation. And because **SmartMart is a complete**, **single-vendor solution**, all components are integrated and fully tested to work together so you avoid the cost and delays associated with piecing together technologies from multiple vendors. It's the closest thing to a data mart in a box. Best of all, SmartMart's open architecture ensures full integration with your enterprise information systems... now and in the future.

### CALL THE BUILDERS

For complete information on our SmartMart data mart program, including a free white paper "The Data Mart: A New Approach to Data Warehousing", call 1-800-969-INFO.

http://www.ibi.com 800-969-INFO In Canada Call 416-364-2760



### APPLICATION DEVELOPMENT

### Java makes Microsoft look like IBM

FRANK HAYES

"[Java is] just a language like Visual Basic or C or any of the languages that we support." — Microsoft Chairman Bill Gates, in a March 1996 Computerworld interview.

> OR ALL THE coffee in Seattle, Microsoft still doesn't get Java.

At Comdex, one Microsoft product manager floated a trial balloon for a new Java strategy: building Windows-only Java compilers and tools that would make Microsoft Java incompatible with other vendors' versions.

Microsoft now denies the plan to gulp down Java and spit it out as just another language

for writing Windows applications. But that's what you do with a language if you're Microsoft. It's a lesson Microsoft learned from IBM and Digital and bygone generations of system vendors: You write compilers that will generate programs that only run on *your* systems.

That worked for IBM's Cobol and Microsoft's C and C++. It will even work for Gates' beloved Basic starting next year, when Microsoft adds a compiler to Visual Basic 5.

But Java isn't just another lan-

True, to programmers, Java resembles a cleaner, less complex version of C++. But who really needs another C++?

No, Java is defined by what it does for users: Java makes it as easy to download and run a program as it is to download a

World Wide Web page or a picture across the Internet — whether it's on a PC, a network computer, a Macintosh or a Unix workstation.

That's why native-code compilers and proprietary extensions won't derail Java. Java's ability to run anywhere is the real reason it's so popular. It means software can be tuned to meet business needs, not platform requirements.

And that's such a radical notion that even hidebound IS departments creaking along with legacy mainframes and aging Cobol code understand that Java is a great new way to solve some kinds of business problems.

So why can't all the hip, smart people who run Microsoft figure out that Java isn't just another language?

Maybe Microsoft has the same problem IBM once had

> with PCs. IBM didn't invent desktop computers, but IBM's brand name sparked the PC's explosive growth, and IBM led the PC market for years. Clearly,

PCs were important to Big Blue.

But IBM's executives believed mainframe applications were, and would continue to be, the center of the universe for corporate IS shops. As a result, IBM missed a lot of opportunities in stand-alone PC software and later in workgroup applications those failures took their toll during IBM's long, painful slide from the top.

Now Microsoft has the same unhealthy attachment to PC software that IBM once had to mainframe software. PC software is where Microsoft's profits are. More important, it's where the hearts and minds of Microsoft's executives are. It just doesn't happen to be where the future is.

PC software will continue to be important to IS shops, just as mainframes will. In some places, mainframes — or PCs — will even continue to be the center of the universe. But for most IS shops, the future belongs to network-oriented, runanywhere applications — the kind you build with Java.

And if Microsoft can't come to grips with that, it may be headed for a long, painful slide.

Hayes is Computerworld's staff columnist.

### Microsoft's Java compiler

CONTINUED FROM PAGE 53

source code into applications that will run faster on Windows — but only on Windows.

Less than two weeks ago, Charles Fitzgerald, program manager at Microsoft's Internet Platform and Tools Division, confirmed published reports that Microsoft is working on the compiler but was far from a completion date. Last week,

### "By enhancing [Java] for Windows, . . . you only lose 10% of the market." - Scot Wingo, Stingray Software

Fitzgerald said there must have been some confusion because Microsoft is only considering whether to build the compiler.

"I would guess it's a trial balloon or something they're working on and are just not ready to discuss yet," said Dave Kelly, an analyst at Hurwitz Group, Inc. in Newton, Mass. "I'm sure Microsoft is working on ways to embrace and extend Java and capture Java programmers in the Windows platform. Whether it's something they would release or not is the question."

In the second interview, Fitzgerald said a compiler makes sense and may become a reality some day. But he added that Microsoft may not be the company to come out with it.

Some users and analysts said they are concerned that Microsoft's Java development efforts could take the punch out of the programming language.

Patrick Connolly, president of Investors Edge, a development company in San Francisco with an online investment site, said a

Windows-centric compiler would make sense for Microsoft because it would help sell its operating systems. But it would also weaken the cross-plat-

form appeal of Java, he said.

Java applications written with a native code compiler for one operating system can be run on another, but they won't have the extended functions specific to the original platform. Java applications that use specific Windows functions — Paint or Draw routines, for example won't be understood on another platform; those functions will run only under Windows.

"It's the option for somebody writing a Windows application. Why should they be excluded from writing in Java without taking a big performance hit and a big functionality hit?" Fitzgerald said.

Not everyone agrees.

"There are enough platformspecific languages around today, like C++, so turning Java into just another platform-specific language could quite possibly kill any hope it had of succeeding," Kelly said. "People would like to see basic improvements in Java, from capability to speed. Both companies could be paying attention to that."

### **SPEED FIRST**

Kelly said the move has been inevitable because the entire industry is focused on speed. Fast applications will always win out — even over cross-platform applications, he said.

And that trade-off is fine with Scot Wingo, co-founder of Stingray Software, Inc., a Chapel Hill, N.C., company that develops Java class libraries.

"The Windows market is 90% of what people are going to be using Java on," Wingo said. "Developers feel their hands are tied because right now Java is watered down. By enhancing it tor Windows, that makes it so much more powerful, and you only lose 10% of the market. That's not a bad decision."

Sun just announced improvements to Version 1.1 of the Java Developers Kit, the most noted of which makes Java run faster on Windows. Estimates of how much faster aren't available yet.

### **Vertical markets**

months to write the application from the ground up after general-purpose tools failed to fit the bill, said Kochar, who works at Legacy Technology, Inc. in Burlington, Mass.

### **TOUGH SELL**

But several information systems managers who are building data warehouses DECISION-SUPPORT

said they were skeptical about

the value of vertical tailoring. Even within industries, applications can differ so much from company to company that heavy customization is needed no matter what, they said.

"Every insurance company has got vastly different applications," said Bob Peck, chief information officer at Allianz Insurance Co. in Burbank, Calif. "I'm afraid we'd just get a template and end up tweaking it so much that its value would end up being questionable."

Meri Lea Miller, data warehouse project manager at the Municipal Electric Authority of Georgia in Atlanta, said Municipal Electric has "very unique" applications compared with oth-

er utilities. Tailored tools "probably

wouldn't do that much for us," Miller said.

For many vendors, the vertical approach "is plan B," said Brian Murphy, an analyst at The Yankee Group in Boston. "The whole data warehousing thing hasn't really gushed money for these people, so they might as well go back to the drawing board," Murphy said.

SOFTWARE

THOMSON SOFTWARE PRODUCTS has announced ObjectAda for Windows and ObjectAda for Unix software development environments for creating applications based on the object-oriented Ada 95 language.

According to the San Diego company, ObjectAda has open interfaces to other languages and full compatibility with the proven Ada 83 language. Pricing starts at \$595 for a Windows Edition and Professional \$8,000 for ObjectAda for Unix. **Thomson Software Products** 

(619) 457-2700

www.ide.com



The beauty of our Web-deployable software is that you can install 100 different sites in 5 minutes.



@1996 Lawson Software

(But that'll be our little secret.)

LAWSON INSIGHT,™ the world's first Web-

deployable business management system, can be up and

running throughout your organization with one installation — no matter how

many sites or hardware platforms are involved. Any workstation with a Web browser can access

it, without sacrificing functionality. And new sites can be added simply by adding browser software. Plus,

LAWSON INSIGHT supports Activity-Based Management, delivering process-driven integrated, cross-functional solutions

through financials, human resources, procurement and supply chain process suites. LAWSON INSIGHT. Because the future can't wait.

# TURBO CHARGE

WEB SITE

WITH THE

VAYU WEB 500

VAYU WEB, INC. REINVENTING THE

FOR A FREE BROCHURE: EMAIL INFO@VAYUWEB.COM OR CALL (914) 697-4943

he Vayu Web 500 is the world's first product to fully automate your Internet/Intranet web site. Through the power of advanced AI technology the Vayu Web 500:

- Significantly reduces waiting time
- Eliminates site navigation
- Is Internet/Intranet TV friendly
- Supports all major multimedia technologies
- Provides total presentation control
- Integrates easily with your current web site
- Offers online ordering capability
- Revolutionizes the site building process
- Highly affordable







FOR A FULL PRODUCT DEMONSTRATION AND
TO ORDER YOUR COPY OF THE VAYO WEB 500 ONLINE, VISIT US AT:

WWW.VAYUWEB.COM

INTERNET.



### ClientPro™ P120

- Intel 120MHz Pentium® processor
- 256KB pipeline burst cache, flash BIOS
- 16MB EDO RAM
- 3Com® 3C509 ISA NIC (BNC, AUI & RJ-45)
- 3.5" floppy drive
- PCI 64-bit graphics accelerator, 2MB EDO RAM
- Tool-free minitower or desktop
- Microsoft® Mouse, 104-key keyboard
- MS-DOS® 6.22/Windows® for Workgroups 3.11
- Microsoft Works preinstalled
- 5-year/3-year Micron Power\* warranty
  - 1.2GB EIDE hard drive
  - 14" Micron 14FGx, .28dp (12.9" display)

• 2.1GB EIDE hard drive

• 15" Micron 15FGx, .28dp (13.7" display)





## ClientPro<sup>"</sup>2 180

- Intel 180MHz Pentium® Pro processor
- 256KB internal cache, flash BIOS, DMI support
- 16MB EDO RAM
- 1.2GB EIDE hard drive
- 3Com® 3C509 ISA NIC (BNC, AUI & RJ-45)
- 3.5" floppy drive
- PCI 64-bit graphics accelerator, 2MB EDO RAM
- 15" Micron 15FGx, .28dp (13.7" display)
- Tool-free minitower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows NT® Workstation 4.0
- Microsoft Works preinstalled

With Intel 133MHz Pentium processor . . . . . odd 550

900 E. Karcher Raad, Nampa, ID 83687 • Man-Fri 6am-10pm Sat 7am-5pm (MT) • International Sales Haurs: Mon-Fri 6am-7pm (MT) • Phone: 208-893-3424 • Purchase Order Fax: 208-893-8992 Technical Support Available 24 Hours A Day-7 Days A Week • Technical Support Phane: 888-FIX-MYPC Technical Support E-mail: techsupport.meic@micron.cam





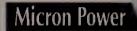






**ELECTRONICS. INC.** 

800-214-6675 http://www.mei.micron.com





Warranty & Support

- 5-year limited warranty on micrapracessar and main memory
- 3-year limited ports-only system warranty
- 1., 2- or 3 year aptianal an-site service agreement for Micron desktop systems
- 30 days of free Micron-supplied saftwore support far Micron desktap systems
- 30-day maney-back palicy
- 24-haur technicol suppart

The foregoing is subject to and qualified by Micron's standard limited warranties and terms and conditions of sale terms and conditions of sale may vary for specific configurations. Copies of the limited warranties may be obtained on our Web site or by calling Micron

# The Enterprise Network

LANs + WANs + Network Management

# Price per port for managed Ethernet hubs



Source: Dell'Oro Group, Portola Valley, Calif.

# Briefs

### Novell, Vinca partner

Novell, Inc. and Vinca Corp. have inked a strategic marketing alliance that calls for the two firms to jointly resell and train customers on their respective fault-tolerant servermirroring products. Under the terms of the pact, Vinca's StandbyServer will be available to Novell IntranetWare, NetWare and SFT III customers through resellers. Additionally, product information, including an option for integrated installation of Standby-Server and SFT III will be added to the next version of Intranet-Ware due in February.

### **WAN connectivity**

NetManage, Inc. in Cupertino, Calif., has begun shipping Chameleon HostLink, software that provides mainframe and IBM AS/400 terminal and print emulation over either SNA or TCP/IP. The package includes file-and-print sharing tools, integrated electronic mail, Internet access software and an Internet newsreader. It costs \$400.

### SoftSwitch cuts plans

Lotus Development Corp.'s SoftSwitch division is curtailing plans to support the HP-UX Unix operating system on its Lotus Messaging Switch 2.0. It claims most of its users are opting for the company's upcoming AIX version. Previously, the Wayne, Pa., division had come under fire for offering the switch on only Data General Corp. platforms [CW, May 6].

# Downshifting

▶ Internetworking vendors aim at smaller offices

By Bob Wallace

INTERNETWORKING vendors that concentrate on the small or home office market may benefit large organizations by supplying a wider range of products for branch offices and telecommuters. But users fear overzealous vendors will overlook quality in the fight for market share.

The Big Four — 3Com Corp., Cisco Systems, Inc., Bay Networks, Inc. and Cabletron Systems, Inc. — and many smaller firms have turned their attention in part from high-end to low-end networking.

"I'd prefer to see more ven-

dors do what 3Com has done—design and build a complete manufacturing system before completing design of the product," said Steve Lopez, network manager at the National Board of Medical Examiners in Philadelphia. "What I see all too often is vendors rushing product to market and losing control by dealing with third-party fabricators. The result can be serious product bugs and recalls. It's expensive — but best — for vendors to retain total control."

But done correctly, a line of products designed for small office users could make it easier to upgrade branch offices for in-



"It's expensive – but best – for vendors to retain total control"

tranets and other applications, users said.

The tidal wave of small office offerings runs the gamut from rock-bottom-priced remote of-Small offices, page 67

### E-mail switch bridges messaging, groupware

By Barb Cole

WORLDTALK CORP. is readying software designed to help companies bridge the gap between proprietary and Internet messaging systems and potentially link them to electronic commerce applications.

Several Worldtalk customers this month will begin betatesting NetTalk, server software that combines security, intranet electronic mail and directory services with messaging switching and directory synchronization technology. The software bundle will be announced this week at the Internet World trade show in New York.

NetTalk provides Post Office Protocol 3 and Simple Mail Transport Protocol E-mail services, a Lightweight Directory Access Protocol directory and connectors to Microsoft Corp. Exchange, Lotus Development Corp. Notes and several LANbased mail systems.

To help make messaging E-mail, page 64

# OS/2 users are faced with install obstacles

By Laura Di Dio

1BM OS/2 WARP 4 users are frustrated and indignant that major PC hardware vendors don't preload the IBM operating system, forcing users to do their own installations and fend for themselves on technical support.

Currently, 32 domestic PC hardware vendors, including IBM, offer to preload OS/2 Warp on their hardware. But most of the major PC manufacturers, including Compaq Computer Corp., Dell Computer Corp. and Toshiba Corp., don't preload the IBM operating system.

This is in sharp contrast to Windows 95, which comes preloaded on PCs and laptops from virtually every systems vendor.

David Knight, assistant vice president and manager of server technical services at Trustmark National Bank in Jackson, Miss., said he is particularly rankled by the lack of after-market technical support for OS/2 Warp by major PC makers.

# "Let's keep a good thing a secret. That way, IBM will have more time to give us continued excellent service and support."

- Dan McCrary, Mazda

"The PC makers refuse us technical support. Dell just tells us outright, 'If you have OS/2 Warp, you're on your own,'" Knight said. Compaq, he added, will at least try to troubleshoot OS/2 Warp-related problems, "but it usually takes a while."

In response, John Albee, IBM's program manager for Warp, page 69

ASCEND'S NEW DSL LINE							
For the carriers	Availability	Price					
8-port ISDN DSL for Max 4002/ 4004	Now	\$3,000, or \$375 per port					
12-port ISDN DSL for Max TNT	March 1997	\$4,200, or \$350 per port					
6-port ADSL-CAM for Max TNT	February 1997	\$8,250, or \$1,375 per port					
For the customers							
Single Line Digital	February 1997	\$1,495					
ADSL	This month	\$1,750					
DSLPipe (ADSL-DMT)	To be determined	To be determined					

**TELECOMMUNICATIONS** 

### **Expanding copper pipes**

► Ascend switches aim to ease digital links

By Kim Girard

REMOTE ACCESS GIANT Ascend Communications, Inc. plans today to release a set of products designed to let carriers and Internet service providers offer high-speed Digital Subscriber Line (DSL) links to the Internet.

DSL uses existing copper wires to carry digital traffic be-

tween a user and a carrier's central office. Ascend is pitching DSL as an Internet access technology that is easier to use and eventually will offer higher speeds than alternatives such as Integrated Services Digital Network (ISDN).

MultiDSL is a line of DSL cards for Ascend's wide-area switches, the Max 4002, Max 4004 and Max TNT. The company will also offer DSL-supporting bridges and routers that Ascend, page 67

# Worldtalk bridges gap

CONTINUED FROM PAGE 63

more bulletproof, NetTalk will include Secure Messenger, desktop encryption software that plugs in to browsers as well as mail clients and supports Secure Multipurpose Internet Mail Extensions.

"NetTalk will let us use standards-

based messaging software in some departments but still let the power users have access to Notes and Exchange," said Jack Evans, network services manager at Perot Systems Corp.'s financial services division in Dallas.

Both Netscape Communications Corp. and Software.com, Inc. plan to offer similar messaging and directory bundles, but those offerings aren't expected to include built-in hooks to legacy mail systems.

Most corporations send E-mail and attachments between LAN-based E-mail systems and the Internet. But a growing group of users are looking to send more confidential documents, such as purchase orders and invoices, via E-mail.

# ANNOUNCING THE INTERNET OPEN WINNERS

Computerworld-Sponsored Program Evaluates Intranet and Internet Commerce Solutions



The Internet Open was the highlight of the inaugural and highly successful Internet Commerce Expo (ICE) convened in Anaheim in

September. ICE is an International Data Group (IDG) company.

Sponsored by Computerworld, leading Internet commerce and Intranet computing solution specialists competed. Systems integrators, software development companies, consulting firms, and business partners - many in partnership with sponsors - distinguished themselves in this unique competition. Netscape, Oracle and CommerceNet were Industry Sponsors. LAN and Internet access was sponsored and supported by IBM.

A prestigious panel of industry luminaries, consultants, publication executives, and technology columnists served as judges. Bob Metcalfe, founder of 3Com and currently VP of Technology with IDG, was "lead judge." Evaluation criteria included technical innovation, userfriendliness, security features, platform flexibility, visual impact, cost-effectiveness, and productivity improvement impact.

### Winners of "Best of Class" awards of The Internet Open:

Solution Category Banking and Investment Financial and Administration (Co-winner) Retail Manufacturing Wholesale and Distribution Transportation and Travel **Energy and Utilities** Voice and Telecom Government and Public Admin. Printing and Publishing Marketing and Merchandising **Education and Training** Networking Internetworking Network Management **Database Systems Human Resources** 

Company **eCommLink** Booz-Allen & Hamilton Inc. NetDynamics, Inc. **Trident Data Systems BHR Info.Net** pcOrder.com FedEx TradeWave Corporation Spanlink Communications Social Security Administration Saggara Systems PictureTalk, Inc. Marshall Industries PictureTalk, Inc. NetDynamics, Inc. Check Point Software Tech. Level\5 Austin-Hayne

Location Houston, TX New York, NY Menlo Park, CA Los Angeles, CA San Jose, CA Austin, TX Memphis, TN Austin, TX Minneapolis, MN Baltimore, MD Sunnyvale, CA Pleasanton, CA El Monte, CA Pleasanton, CA Menlo Park, CA Redwood City, CA Melbourne, FL San Mateo, CA

s, MN
MD CommerceNet
CA CommerceNet
, CA
A CommerceNet
, CA
, CA
, CA
Gradient Tech.
ity, CA Oracle

Netscape

Sponsor

**Netscape** 

Deloitte & Touche

CommerceNet

Left to right, Bob Metcalfe, IDG; Rupen Shah, Netscape; Ooug Jackson, Austin-Hayne; and Gary Beach, Computerworld

Program Sponsor Computerworld and "Industry Sponsors" recognized



Gary Beach, President and CEO of Computerworld and Bob Metcalfe presided over The Internet Open awards ceremony. Mr. Beach noted, "...each participant distinguished their organization with their commitment to the advancement of enduser and customer productivity, service, and responsiveness being made commercially available via the Web." He added, "You are all winners through the initiative you have taken in this program - a first of its kind in Internet commerce events."

Applications are being accepted for the 1997 programs of The Internet Open in Atlanta, April 9-11 and Los Angeles, September 9-11. Information on ICE is available via a World Wide Web site http://www.idg.com/ice or by calling The Internet Open HOT-LINES at 508-820-8612/8603.

COMPUTERWORLD
The Newsweekly for Information Technology Leaders



# NEW E-MAIL BOXES WORLDWIDE LAN Internet 32.3M

32.3M\*

28.1M\*

23.6M\*

15.1M

9.7M\*

1.2M

1995

1996

1997

1998

\*Projected

Source: International Data Corp., Framingham, Mass

"We use E-mail today for communications, but we would like to use it for [line-of-business] transactions," said Truman Harsha, team leader of the network operations group at the U.S. Department of Agriculture in Fort Collins, Colo. The agency uses Worldtalk's existing directory and messaging switching technology to link more than a dozen E-mail systems on a 20,000-user E-mail network.

Harsha said the additional security in NetTalk could help the agency expand its use of E-mail to include confidential documents. In addition, NetTalk's LDAP directory could be used as the basis of agencywide white pages that encompass entries from several applications.

NetTalk will ship in the first quarter of next year. Pricing will be \$1,995 for 50 users and \$6 per seat for 5,000 users.

### HP resells Platinum

The Professional Services Organization (PSO) of Hewlett-Packard Co. will globally sell and support more than 50 products from Platinum Technology, Inc. in Oakbrook Terrace, Ill. HP's PSO now provides consulting and systems integration for a broad range of tools needed for management and data warehousing. That means information systems managers can have a single contact for integrating Platinum products on HP's OpenView.

# HIRING IN 97? MAKE IT KNOWN!

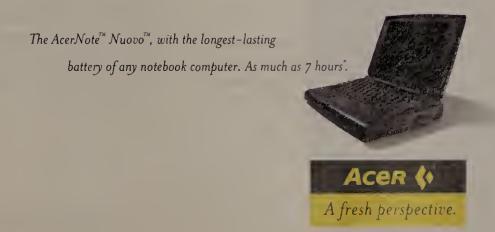
Advertise in Computerworld's 1997 Careers Forecast & Outlook 1997 Forecast Issue: January 2 Deadline: December 23

1-800-343-6474, x8201



THE average battery lasts three hours.

Some people need a little more than that.







### Notebooks

The new AcerNote™ Nuovo™ delivers up to seven hours of battery life from a single battery—hours longer than any other notebook PC¹. And since you'll be working longer, its ergonomically engineered keyboard raises and tilts for easier access and viewing.

In fact, everything about the Nuovo, from its 28.8KBps internal modem with fax and speakerphone to its expandable memory to its 6x CD-ROM module, is about making everything you do quicker and easier.

- •133MHz Intel® Pentium® Processor
- •11.3" SVGA Dual Scan or 11.8" Active Matrix Color Display
- •16MB EDO RAM (Expandable to 64MB)
- •Interchangeable 6x CD-ROM/ Floppy Disk Drive
- •Lithium Ion Battery with up to 7 Hours of Battery Life
- •2MB Video RAM Performance
- •16-Bit Sound Blaster\* Compatible Audio with Built-In Stereo Speakers
- •3-Year Limited Warranty/1-Year Rapid Repair Service\*

### Servers

Need a server that's easy to set up and manage? Acer offers not one, but three. The entry-level AcerAltos™ 900; the AcerAltos 9000, for midsize company or departmental needs; plus the full-featured AcerAltos 19000, a scalable system designed to handle advanced operating systems.

Whichever you choose, you'll get a solid platform for Internet applications, as well as the kind of quality that results when one company designs, develops and manufactures its own systems.

- •CPUs from One 133MHz Intel Pentium Processor to Two Intel Pentium Pro Processors
- ECC/EDO Memory
- •Up to 8 Expansion Slots (5 PCI, 2 EISA, 1 PCI/EISA), plus 14 3.5" Half-Height Drive Bays
- •Acer StartUp Utilities on CD-ROM and Acer Server Manager Software
- •Support for Microsoft Windows NT<sup>™</sup> Server, Novell\* NetWare<sup>™</sup> SMP\* and SCO\* OpenServer<sup>™</sup>
- •3-Year Limited Warranty/On-Site Service

### Desktops

There's no other poweruser system easier to tailor to a user's needs, or a tight budget, than the AcerPower<sup>™</sup> 5000 Series and 9000 Series PCs.

Available in either desktop or minitower models, each of these configurations is designed to run the most powerful business, graphics and multimedia applications. And thanks to its extensive expansion capabilities, the AcerPower can be tailored to something you might consider even more important: the future.

- •Intel Pentium 100MHz, 133MHz or 166MHz Processors
- •8/16/32MB EDO Memory up to 128/192MB, 256KB External Write-Back Pipeline Burst Cache
- •64-Bit PCI Local Bus Video
- •Stereo Plug-n-Play Sound Blaster Sound Card and 15W Speakers\*\*
- •Pre-Loaded Microsoft Windows 95, Windows NT or Windows for Workgroups
- Software MPEG Support\*\*
- •3-Year Limited Warranty/First-Year On-Site Service



1-800-551-ACER

www.acer.com/aac/



**NETWORK MANAGEMENT** 

# Cabletron to buy Oasys

By Patrick Dryden

CABLETRON SYSTEMS, INC. last week announced plans to expand support for telecommunications service providers by acquiring Oasys Group, Inc. for an estimated \$10 million.

The agreement calls for an exchange of 240,000 shares of Cabletron stock for all outstanding shares of Los Gatos, Calif.based Oasys, pending approval by Oasys shareholders.

Oasys supplies software to manage the Synchronous Optical Network (Sonet) devices that provide high-speed backbone connections.

Cabletron intends to integrate the Oasys TLI/CMIP Gateway with Spectrum, Cabletron's enterprise network management platform. As a result, service providers can replace separate tools for managing Sonet backbones, internetworking devices and computer systems with one Spectrum platform.

The worldwide market for telecommunications management software and services could exceed \$8 billion next year, according to projections by Meta Group, Inc. in Westport, Conn.

To better serve that market, Cabletron, in Rochester, N.H., recently introduced Asynchronous Transfer Mode switches for carriers and acquired vendors supplying support for frame-relay connections and remote access via Integrated Services Digital Network.

# Small office internetworking

CONTINUED FROM PAGE 63

fice routers and Integrated Services Digital Network access devices to stackable hubs and small-model switches.

"The applications that corporations want to extend to small and home offices are dictating more bandwidth," said Jim Hutchinson, network manager at Children's Hospital in Boston. "I expect to see the carriers placing much more emphasis in developing and offering enhanced services to these sites [as well], which will grow the overall market."

Analysts say it will take a while for vendors to catch on.

"This is a whole new way of doing business for most of these companies, which will find they need expansive and effective distribution channels, as well as

the latest manufacturing system technologies to keep price down in this low-margin commodity business," said Eric Hindin, an analyst at The Yankee Group, a consulting and research firm in Boston.

### MARKET RUSH

Vendors are rushing in because they see a big market now.

"They've sold to the Fortune 500 and are now

pursuing the Unfortunate 5,000, so to speak," said Hindin. "This market is potentially more lucrative than the highend switching market, especially when you envision every home having at least Internet access. The sky's the limit."

Lopez says vendors with the right strategy will be able to succeed.

"If a vendor captures a remote site or sites of a company hasn't already made a long-term commitment to higher-end equipment, they've got their foot in the door," Lopez said. "That vendor may end up winning the firm's entire enterprise business. That's a per-

### 3Com, Cisco, Bay **Networks** and Cabletron have turned their attention in part from high-end to low-end networking.

# Ascend pitches Digital Subscriber Line links

**CONTINUED FROM PAGE 63** 

were designed for branch offices connecting to a corporate network or the

An eight-port DSL card that delivers 128K bit/sec. speeds on copper lines is available now.

Because many carriers and Internet providers have already standardized on Ascend's remote-access switches, the new product line could make DSL a nearterm option for telecommuters and remote-office users who need to access networks faster than with traditional modems, analysts said.

"Ascend has ruled the Internet roost for so long, and now they get to do it with ADSL [Asymmetric Digital Subscriber Line] as well," said Kieran Taylor, an analyst at TeleChoice, Inc., a consultancy in Verona, N.J.

At least one large carrier is testing its technology, according to Ascend officials.

"I'm interested to see what the phone companies come up with and how soon," said Cecil Stump, service technologies manager at Picker International, a medical image equipment manufacturer in Mayfield Village, Ohio. The company has 800 domestic users who dial in to the company's network via Ascend's Max 4002 switch.

"I'd like to give our users in the field the ability to connect with the [Internet service provider] faster so they'll be able to send data faster," Stump said.

"Hopefully, in the future, if this be-

"Ascend has ruled the Internet roost for so long, and now they get to do it with ADSL [Asymmetric Digital Subscriber Line] as well."

- Kieran Taylor, analyst, TeleChoice

comes a more popular technology, we'll use it," he said.

But Michael Hullhorst, senior systems architect at Applied Cybernetics, a systems security consultancy in Columbus, Ohio, that uses Ascend switches, questioned whether DSL is the best solution for remote business needs.

"The businesses I work with are moving to ISDN - most find it more costeffective," Hullhorst said. "I really see DSL as more of a consumer approach." Nevertheless, Hullhorst said he will investigate the cost and constraints of DSL technology, along with other options, such as cable modems.

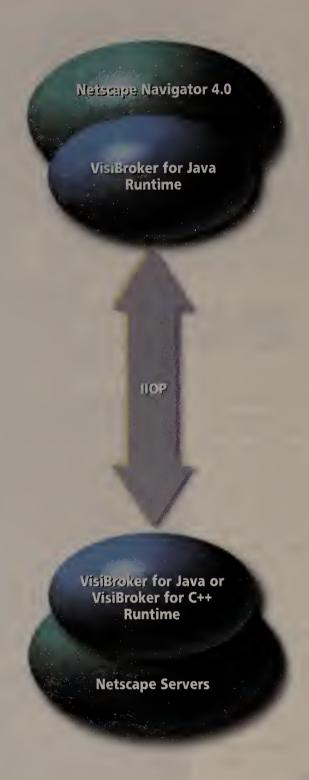
### **SPEEDIER CONNECTIONS**

Ascend's MultiDSL platform could eventually enable users on an Internet Protocol, Asynchronous Transfer Mode (ATM) or frame-relay network to connect at speeds of up to 6M bit/sec. to carriers and Internet providers that support DSL.

By the beginning of next year, Ascend plans to support on a single platform a host of other high-speed transports, including Single-line DSL, which offers 768K bit/sec., and two types of ADSL, Carrierless Amplitude-modulation (CAM) and Discrete MultiTone (DMT). ADSL offers data rates of up to 6K bit/sec. downstream and 640M bit/sec. upstream.



### THE LEADING JAVA ORB





We've all read the headlines about Netscape and their commitment to providing the most advanced technology for the Web. The story behind the headlines: Netscape is using Visigenic's object request broker technology to enable Netscape ONE to support the Internet Inter-ORB Protocol (IIOP) — the standards-based way your Java applets and distributed application objects will link together to create powerful business applications for the Internet and Intranet. So why turn to Visigenic? Because nobody knows more about IIOP and ORB technology for the Web. After all, Visigenic, a pioneer in distributed object technology, developed the first Java ORB, and was the first to commit to IIOP. There's more. With VisiBroker for C++ complementing VisiBroker for Java, you can link application objects from both your enterprise and Web servers. The real news here: develop with VisiBroker today and be ready to take advantage of the VisiBroker runtime that will be part of the upcoming version of the world's most popular Web browser. To contact Visigenic call 1-800-800-0361, 1-415-312-7197, or e-mail info@visigenic.com.

VisiBroker for Java and VisiBroker for C++ are formerly Black Widow and ORBeline from Post Modern Computing.

Visigenic and its logo are registered trademarks of Visigenic, Incorporated. VisiBroker is a trademark of Visigenic, Incorporated. Netscape, Netscape Navigator, and Netscape ONE are trademarks of Netscape Communications Corporation.



# OS/2 Warp

CONTINUED FROM PAGE 63

OS/2 Warp, said IBM's strategy is to promote OS/2 Warp installation among large corporate accounts.

Acknowledging that customers "will find it tough" to get OS/2 Warp preloaded, Albee said IBM is "working to resolve the issue with Compaq, Dell and HP."

Large accounts are generally unaffected by third-party vendors' decision not to preload OS/2 Warp, Albee said. Fortune 1,000 organizations typically have a standard configuration on a disk image and clone it onto the hardware, he said.

That's what Dan McCrary, manager of dealer and field systems at Mazda Motor of America, Inc. in Irvine, Calif., does.

McCrary said the major PC vendors are ignoring or refusing to preload OS/2 Warp mainly for economic reasons. "There are major costs related to the support of preloaded operating systems, and many hardware manufacturers don't want to assume the burden," he said. "Those that do have already been snatched up by Microsoft."

Some OS/2 Warp users placed the lion's share of the blame on IBM archrival Microsoft.

"Let's face it, Microsoft has a strangle-

### Falling through the cracks

As if users don't have a hard enough time getting PC manufacturers to preload OS/2 Warp, in at least one case IBM itself failed to preload OS/2 Warp on one of its

"I can't even get an IBM ThinkPad 760ED with OS/2 Warp 4 preloaded, despite the fact that I had specifically ordered it," complained Bill Teags, IS manager at Advanced Package Engineering Corp. in Phoenix. Teags said when his system came, Windows 95 was preloaded on it.

To add insult to injury, when Teags called IBM technical support to ask for the OS/2 Warp 4 drivers he needed to do the installation himself, he got no assistance.

"It was both pathetic and irritating. I love the OS/2 Warp platform and loathe the lack of support we get from IBM," Teags said. The actual installation wasn't a problem because Teags is an experienced OS/2 network administrator, but he said he was irked "that IBM technical support refused to send the drivers, forcing me to search for them on the Internet."

John Albee, IBM's program manager for OS/2, said Teags' experience is the exception and not the rule. "I will personally investigate why customers are having problems getting IBM technical support to send out OS/2 Warp drivers. We will rectify the situation," he said.

Meanwhile, Albee said, there is a device driver CD-ROM that lets users link to a World Wide Web site to obtain the latest patches. Additionally, OS/2 Warp customers can obtain patches for IBM PC hardware at www.pcco.ibm.com. — Laura DiDio

hold on the hardware vendors. They own 85% to 90% of the desktops, so clearly they have more clout to get Windows preloaded than IBM does with OS/2 Warp," said an information systems manager at a large Southern insurance company who requested anonymity.

The dearth of machines preloaded

with OS/2 Warp does have a silver lining for McCray. "If IBM chooses not to market what I consider the best operating system in existence, that's fine with me. Let's keep a good thing a secret. That way, IBM will have more time to give us continued excellent service and support," he

# German firm offers Novell-based connections

By Kristi Essick

San Francisco

Deutsche Telekom AG recently announced it will be the third major carrier to offer remote access and branch-office connectivity services based on Novell Connect Services (NCS) from Novell, Inc.

DT said that market trials involving "several major German companies" will begin this month, but it didn't release any names. Commercial availability of the service is expected during the first

quarter of next year.

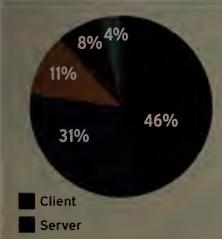
Initially, the IntraLink service will provide DT's business users with remote access to branch offices and corporate sites as well as network-to-network connectivity to create virtual private LANs.

These services will be based on NCS, which enable customers to build networks that link business sites, remote users, corporate intranets and the Internet. NCS uses the NetWare network operating system and Novell Directory Services to connect and manage heterogeneous networks.

AT&T Corp. and Japan's Nippon Telephone & Telegraph Corp. (NTT) are already providing customers with Novell's services through the AT&T WorldNet Intranet Connect Service and the NTT Network Connect Services, Novell officials said. However, DT represents Novell's first large-scale foray into European telecommunications, officials said.

Essick writes for the IDG News Service's San Francisco bureau.

### CLIENT/SERVER MESSAGING **START-UP COSTS**



Nonrecurring engineering

Backbone

Training

SUN MICROSYSTEMS, INC. has announced Sun Developer Support Services for Java. The services are for developers working in the write-once, read-anywhere Java network application environment.

According to the Mountain View, Calif., company, the support services are delivered online or through live telephone queries. A one-year subscription costs \$695.

Sun Microsystems (415) 960-1300 www.sun.com

BEST POWER has announced a new generation of the Best Power Fortress family of uninterruptible power systems for network computing settings.

According to the General Signal Corp. division in Necedah, Wis., the 520VA and 720VA models include PowerSteady voltage regulation, hot-swap battery capabilities and plug-and-play compatibility with Windows 95. Pricing for the new models starts at \$509.

**Best Power** (608) 565-7200 www.bestpower.com

KASPIA SYSTEMS, INC. has announced the Kaspia Monitoring System, software for network monitoring.

According to the Beaverton, Ore., company, the system automatically polls priority areas and gives network managers a road map of problem areas. Pricing for the system starts at \$15,000.

Kaspia Systems (503) 644-1800 www.kaspia.com



# Throw in these and Microsoft's TCP/IP would be one heck of a freebie.



The City connections that matter are YOURS.

以"水类高级类"。《外数图》

With PC users located anywhere and the information they need residing on diverse systems, your free TCP/IP isn't going to cut it. You really need powerful application, enhanced security, sophisticated management tools, and easy connectivity for mobile users — along with open access to any platform. Welcome to OnNet 32 v2.0, the work's most advanced TCP/IP connectivity suite for Windows® 95 and Windows N II. OnNet 32 lets users reach and share information transparently on legacy systems, on your intriner, and over the Internet. It's one of the cornerstones of tomorrow's Virtual IP Network that's ready today. Want to see how it works? Hit our Web site right now.

FREE OnNet32 Interactive Product Tour • http://www.ftp.com/tour/a209
1 - 8 0 0 - 2 8 2 - 4 FTP, ext. 5 2 7 9

FTP Software, the FTP Software logo, and OnNet are registered trademarks of FTP Soft—e line. All other trademarks are the property of their respective holders.

### The Internet

The World Wide Web + Intranets + Online Services

### **BURELY BUSINESS,**

A study by Nielsen Media Research, Inc. in New York found that employees at IBM, Apple and AT&T together visited Penthouse magazine's Web site 12,823 times in one month this year.

### Ultimate webmaster

The Internet Society seeks a full-time webmaster to work at its Reston, Va., headquarters. The position isn't for the clueless, however. The society is looking for someone who knows Unix, graphics creation, graphics manipulation, hypertext authoring, World Wide Web site maintenance and application development, database technology and one or more foreign languages. Send electronic-mail responses to editor@isoc.org.

### <u>Switchboard signboard</u>

Internet cruisers who use Westboro, Mass.-based Banyan Systems, Inc.'s Switchboard Internet directory soon will be wading through ads. Banyan's Coordinate.com Division is transforming Switchboard into an Internet-based Yellow Pages-like directory, complete with display advertising for companies listed. Switchboard, which contains the names of millions of individuals culled from nationwide databases of telephone information, has been popular with individuals trying to track down long-lost chums and the like. But the directory also has more than 11 million business listings.

### Tracking problems

UniPress Software, Inc. in Edison, N.J., recently announced FootPrints, a World Wide Webbased help desk package that tracks user problems, change requests and bug reports. Pricing for FootPrints, which runs on Unix and Windows NT, starts at \$1,995 for three users. Licenses for extra users cost \$495 each.

# Hoax viruses pose threat

By Gary H. Anthes

HOAXES AND FALSE virus warnings on the Internet are considered harmless by some, but they can cause damage by sapping computer resources and wasting users' time spent reading and responding to the warnings.

That is the finding of the Computer Incident Advisory Capability (CIAC) team at Lawrence Livermore National Laboratory in Livermore, Calif.

"We find that we are spending much more time debunking hoaxes than handling real virus incidents," said a recent advisory by the U.S. Department of FOR MORE VIRUS AND HOAX INFORMATION

ciac.llnl.gov

CIAC notices, antivirus software and other information from the Computer Incident Advisory Capability's computer security archive

www.kumite.com/myths

Computer Virus Myths home page has descriptions of several hoaxes

ciac.llnl.gov/ciac/notes/Notes10.shtml Information about the PKZ300 Trojan program

ciac.llnl.gov/ciac/notes/Notes09.shtml Information about the Good Times virus

Energy's computer incident response team. William Orvis, a CIAC team member, said the response center gets 10 to 15 telephone calls and electronic-mail messages per day from users

who are needlessly worried about hoaxes. Ted Combs, manager of computer security at AlliedSignal Aerospace Co. in Kansas City, Mo., said he is see-Virus, page 73

By Mitch Wagner

Keeping up with the news isn't just a civic duty. For many who work in national or international companies, it's their job to know about events in far-flung regions that can affect their business.

### **CABLE NEWS NETWORK**

### ♦ www.cnn.com

CNN has comprehensive global reporting in a simple, easyto-scan format. The welldesigned front page has headlines and photos for more than 20 news and feature stories. With sparing use of graphics, it downloads fairly quickly.

### **MSNBC**

CNN's upstart competitor MSNBC also has a news site that got off to a fast start, covering the crash of TWA Flight 800. Reactions to its initial coverage were mixed, but its reporting has become more steady.

### THE NEW YORK TIMES AND WALL STREET JOURNAL

### www.nytimes.com www.wsj.com

Unlike the CNN and MSNBC sites, which are updated continuously, The Times site is updated twice daily. The *Journal's* service is subscription-based

The Web also hosts hundreds of local newspapers around the world, from North America to Australia. Check a search engine for one that interests you.

### Monitoring employee access to Web www.msnbc.com

### ► Managers take many routes to curb users

By Justin Hibbard

MONITORING AND filtering users' access to the World Wide Web is becoming a common practice in corporations.

But information systems managers are still experimenting with ways to implement regulations without prompting user rebellion.

### SECRET AGENT

For instance, the IS department at Reno Air, Inc. in Reno, Nev., secretly used server-based filtering software from NetPartners Internet Solutions, Inc. in San



Diego to track employees' use of the Web for one month.

The WebSense software gener-

ates reports that show which uniform resource locators users access and for how long.

department

managers decide

what is abusive.

This allows the IS staff to determine how much abuse is

"It was an eye-opener," said Randy Reigel, a systems engineer at the airline. "It wasn't so much the time people were spending on the 'net, it was

some of the places they were going."

Out of about 250 users, only two or three seriously abused their online privileges, Reigel said.

The IS department secretly con-

figured the abusers' browsers to access the Internet only through WebSense. Now when the users request a forbidden site, Web-Monitoring, page 73

### **Encryption** policies still under fire

By Gary H. Anthes

WASHINGTON

FRIENDS AND FOES of the Clinton administration's encryption policies faced off again on Capitol Hill late last month. But users who are looking for signs of relief from export restrictions were disappointed.

At issue was the administration's controversial position that products with strong encryption may not be exported unless they include a "key-recovery" feature that would let U.S. intelligence and law enforcement agencies decode intercepted messages.

### **DOUBLE WHAMMY**

These export restrictions prevent users overseas from buying the best U.S. encryption products. They also present interoperability problems for U.S. companies that communicate with branches in other countries.

The administration is reviewing with industry representatives the detailed regulations of its latest encryption export policy, which was announced in a broad outline in October, said William Reinsch. Reinsch is undersecretary for export administration at the U.S. Department of Commerce. The regulations take effect Jan. 1.

But the regulations haven't been well-received so far.

Robert Holleyman, president of the Business Software Alliance (BSA) in Washington, last week sent a letter to Vice Presi-

Encryption, page 74

### COMPUTERWORLD

### www.computerworld.com

For computer industry news, you'll get everything you need from the Computerworld site, of course. But on the off-chance there's some morsel of industry news that we missed, most of the trade press have their own home pages with news feeds. Check a search engine for your favorite - ahem, second-favorite - rag.

### **Quad ready** 200-MHz **Pentium Pro** processing starting at



# The ALR Revolution Quad6 the only server with built-in Active CPR...



### **ActiveCPR** in Action

12 integrated sensors constantly monitor vital aspects of processor operation



Out of spec readings trigger Central Processor Recovery procedures.



ActiveCPR warns network users of impending shutdown and initiates safe auto-shutdown of OS then takes suspicious processor off-line and then automatically reboots OS, recovering normal network operation



Server watchdog automatically reboots OS in the event of a software crash

When server availability is at a premium, you need the experience of an industry leader on your side. And that's why you need the Revolution Quad6 by ALR. With over ten years of experience engineering high-end servers, ALR has captured practically every major industry server award. Awards like PC/Computing's "Most Valuable Product", InfoWorld's "Hot Pick", and *UnixReview's* "Outstanding Product of the Year" for two years running.

And now, ALR and the Revolution

Quad6 take you to the next level of server availability with ActiveCPR.

What's ActiveCPR? Simply put, ActiveCPR (Central Processor Recovery) is an advanced auto-recovery system engineered to protect your network from both processor failures and software crashes. Combined with ALR InforManager's 36 integrated early warning sensors, this technology makes unexpected downtime practically a thing of the past!

Best of all, you can get these high availability features, plus the Revolution Quad6's award-winning performance and massive expandability, all for up to three thousand dollars less than a competitive Compaq® ProLiant 5000.<sup>TM 1</sup>

And if you purchase your Revolution Quad6 between December 2nd 1996 and February 28<sup>th</sup> 1997, ALR will even give you LANDesk ® Server Manager Pro, a \$1,495 (MSRP) out-ofband server management package, for free!

So why take a chance on anything else? For the ultimate in performance and reliability, visit your authorized ALR reseller today.

1-800-444-4ALR (ref# 5806)





























# Virus hoaxes are spreading

CONTINUED FROM PAGE 71

ing many more warnings about nonexistent dangers. The warnings often include instructions to pass them on to others. "These things are like a chain letter," he said. "They amount to a denial-of-service

"These spoofs are a significant problem because they involve a huge amount of lost time," Orvis said. Messages about the nonexistent but widely feared Good Times virus are the worst, he said. "It goes away for a while, then a huge wave of warnings hits the 'net," he said.

Warnings about other false viruses come in waves that last two to three weeks at a time, Combs said. He said it is

company policy at AlliedSignal for users to clear all warnings of security threats through a central help desk, which can quickly separate the hoaxes from real

### REPORT FINDINGS

The CIAC report at ciac.llnl.gov/ warned of the following digital impostors:

- •Warnings about the Good Times virus have been circulating for years. There is no such virus.
- ■The Deeyenda virus is another hoax, and it isn't true that the Federal Communications Commission issued a warning

- ■The PKZ300 Trojan horse hasn't been seen for more than a year, but warnings persist. A Trojan horse is malicious software that masquerades as something
- The Irina virus warnings are a hoax that was created by an electronic publishing company. The hoax was designed to generate publicity for an interactive book of the same name.
- ■The Ghost.exe program isn't a Trojan horse that will destroy your hard drive, as warnings suggest. It is a harmless screen saver that does cute tricks on Friday the

Real warnings from the incident response teams and antivirus vendors have valid return addresses and are usually signed with the organization's Pretty Good Privacy encryption key, CIAC officials said.

### Monitoring employee Web access

"Relationships

between end users and

IS departments are

already at the breaking

point ... So this is just

another reason to hate

your 1S department."

David Strom,

consultant

Sense redirects them to Reno Air's home page.

A more straightforward approach succeeded at Asics Tiger Corp. in Fountain Valley, Calif.

Managers at the athletic clothing company weren't concerned so much about the content users were downloading as

they were about the productivity lost during hours spent Web surfing.

As an experiment, the IS department opted not to block access. Instead, it told employees their Internet use would be monitored by WebSense.

### AUTONOMY

"I didn't think it was right for MIS to decide for the entire company what should be blocked and shouldn't be blocked," said Mark Allen, operations manager of the IS department at Asics.

"We kind of leave it up to the depart-

ment manager or director to decide what's abusive and what's not." he said.

After reviewing access reports for three weeks, managers found only minimal abuse. So the company decided to keep the experimental policy in place.

The reports so far haven't shown a significant rise in abuse, Allen said.

> The IS department at AVL Scientific Corp. in Roswell, Ga., advertised its policy in a more subtle fashion.

> The department told only a few users it would track employees' use of the Web with a beta version of WebTrack for Windows NT from Webster Network Strategies,

Inc. in Naples, Fla.

"We let a few people know to spread the word," said Dax Sharpe, a network specialist at AVL Scientific. "But we haven't made an official announce-

The department monitored a random sample of users but didn't tell employees who was under scrutiny.

Instead, the department let users know by word-of- mouth that any Web use may

"It's not really fair just to do it on the surprise, so we let a few people know," Sharpe said. "The general response we've gotten back is it's not an invasion of privacy. They're just impartial to it."

### STAY NEUTRAL

Impartiality is about the best response an IS department can hope for when it blocks Internet access, said David Strom, president of David Strom, Inc., a consultancy in Port Washington, N.Y.

"Relationships between end users and IS departments are already at the breaking point," Strom said. "So this is just another reason to hate your IS department."

But that doesn't mean IS managers can't take measures to reduce the ill will, he said. "You should definitely be up front with people and tell them if you're blocking and monitoring," he said. "It's a bad corporate policy to root around in the basement."

### ORTS

### **Domino tool**

Ives Development, Inc. in Cambridge, Mass., this month will ship a software development tool for Lotus Development Corp.'s Domino World Wide Web and Notes server that adds check-in/ check-out capabilities to the Domino development environment. TeamStudio Ciao lets teams of developers work in parallel on the same Domino application. Pricing for the tool is \$495 per Notes developer.

### Intranet support

Baranof Software, Inc. in Watertown, Mass., has enhanced the reporting capabilities of its electronic-mail, modem

and intranet server management tools. The enhancements in the company's MailCheck, ModemCheck and IP.Check products include a selection of new graphical charts, the ability to automatically schedule reports and support for Hypertext Markup Language reports.

### New benchmark

Oracle Corp., Portal Information Network, Inc. and Sun Microsystems, Inc. announced the Internet Transaction Mix (ITM) benchmark at the recent Oracle OpenWorld conference in San Francisco. The vendors claim ITM is a way to measure real-world scalability for Internet and intranet services. The ITM benchmark measures Internet users' activities, including log-in sessions, electronic-mail retrieval and registration of new accounts. It was designed to assure customers that hardware and database systems for Internet and intranet services will scale to accommodate millions of users.

### Client/server on Web

OneWave, Inc. and Ernst & Young are teaming up to integrate client/server business applications with intranets and the Internet. OneWave in Watertown, Mass., supplies World Wide Webenabling software products. Ernst & Young in New York City implements client/server software systems and sells other professional services.



# **Encryption policies take heat**

CONTINUED FROM PAGE 71

dent Al Gore that said, "We seriously doubt the [new export] regulations will work, meet computer user demands or be accepted by the private sector."

A spokeswoman for the BSA said the regulations are being shown to industry groups under strict nondisclosure agreements.



"Distrust of government has never been greater."

"We have no illusion that our policy will be 100% effective," Reinsch said at the November hearing. "Will terrorists use keyrecovery systems? Not necessarily. Anyone determined to make information unavailable to [the U.S.] government can probably do it.'

That, observers said, is the Achilles' heel of the White House encryption policy. But

Reinsch said terrorists and criminals will have to use keyrecovery systems if they become pervasive and institutionalized in international commerce.

"We want a world in which key-recovery products are the rule, not the exception," he said.

But Phil Zimmerman, inventor of the widely used Pretty Good Privacy encryption technology, cited users' right to privacy and the government's alleged record of wiretapping abuse.

"The public is not going to accept key recovery," he said. "Distrust of government has never been greater."

Cryptography expert Dorothy Denning, a computer science professor at Georgetown University in Washington, called on the government and industry to adopt key-recovery technology.

She said organizations need the technology to protect themselves against dishonest em-

"Even large criminal enterprises will use key recovery to protect themselves from their own people," she said.

But government has an obligation to protect its citizens from any security and privacy violations that might result from key-recovery abuse, Denning

Critics say export controls on encryption products are meaningless because strong encryption without key recovery is becoming available from foreign sources.

"When you can go down to Kmart and buy made-in-Taiwan versions of what we cannot export, export controls will fall," said Dan Geer, an engineering director at Open Market, Inc. in Cambridge, Mass.

### **HANDS-OFF POLICY**

In a written statement dated Oct. 1, Gore said the administration recognizes the problems software vendors have living up to White House policy.

"The administration ... recognizes that an industry-led technology will expedite market acceptance of key-recovery, and the ultimate solution must be market-driven," he wrote.

But critics said as long as users are constrained by the keyrecovery mandate, the market can't lead.

"There has been no compromise on the key-recovery mandate," said John Linn, a principal architect at OpenVision Technologies, Inc. in Pleasanton, Calif. "But there are degrees of freedom for industry to decide how that will be accomplished."

When the weather outside is frightful, online shopping can be delightful. But before you log on and go, here are some tips you should know.

The Federal Trade Commission offers these warnings to shoppers who visit electronic commerce sites:

- Use a secure Web browser, such as one that supports Secure Sockets Layer, to protect data you may send to retailers
- Get the company's refund policy before ordering
- Keep any passwords secret, and ignore requests for personal information such as your Social Security number.

For more advice, go to www.ftc.gov/opa/9611/tips96.htm

### GTE seeks to ease 'net transactions

GTE Corp. is testing Cyber-Trust, its method for transmitting and verifying credit-card information over the Internet by using digital certification for ensuring privacy and authenticating transactions. The CyberTrust system was designed to comply with the latest Secure Electronic Transaction (SET) specifications set forth by MasterCard International, Inc. and Visa International, Inc. for transmitting card information. The SET

protocols will establish a messaging system that consumers, merchants and financial institutions can use to verify the identity of other parties in an electronic transaction.

### The Boeing Co. intranet flies

The Boeing Co. recently announced a new intranetbased, multimedia training catalog. The intranet uses Seattle-based ICat Corp.'s **Electronic Commerce Suite to** let users tap into descriptions of training programs.

www.microsoft.com/office/97/netvolu

# British businesses try their hand at virtual reality

By Ron Condon

LONDON

VIRTUAL REALITY is beginning to help staffers at global cable manufacturer BICC PLC work together and see how their overseas counterparts operate.

Although a pilot project currently links only 60 peo-

ple in two U.K. factory sites, the technology has proved itself and will be rolled out to the company's worldwide network of factories, said project manager David Leevers.

BICC's system goes beyond

dividuals World Wide Web access to one another's working environment.

A person's Web page contains not only their portrait, but also a 360-degree panoramic view of their workplace and Hypertext

Markup Language links to the people they regard as their

nearest neighbors, such as local work colleagues or people based elsewhere whom they deal with on a regular basis.

The system also provides a virtual tour of each BICC factory, created from photographs

videoconferencing by giving in- of the site, so remote employees can pay virtual visits from their PC browsers.

> 'We interviewed 100 people in seven countries to see what they wanted from collaborative working and what kinds of contact they would find acceptable," Leevers said.

### **ACCURATE INFORMATION**

The resulting system allows people to share knowledge more effectively, and through the device of "nearest neighbors," reflects the true information grapevine more accurately than a corporate organization chart,

Leevers said.

The BICC project is one of several that have been funded partly by the U.K. government as part of a program to persuade British businesses to make better use of computers in collaborative work.

Eight projects figure in the Computer Supported Cooperative Work (CSCW) program, with a total value of \$20 million and the government contributing \$8.8 million.

The first project, called Virtuosi, deals with virtual reality and has produced two pilot systems, one focusing on manufacturing at BICC and another showing how the fashion industry could use virtual reality.

IN FASHION

The fashion pilot project has been led by Nottinghamshire County Council, which aims to encourage local cloth and clothing manufacturers to make more use of technology.

Under the fashion project, designers can discuss ideas with remote buyers in a virtual space, using a virtual fashion model to show off various designs.

Remote buyers wear a virtual reality headset and glove, which allows them to walk around the model to view the clothes from different angles. Buyers can also gain a more realistic view of

how the proposed design will look by issuing voice instructions to make the model raise her leg or arm or move around.

Virtuosi is the result of cooperation among several industrial partners: British Telecommunications Ltd., BICC, GPT Ltd.

### Remote buyers wear a virtual reality headset and glove, which allows them to walk around the model to view the clothes from different angles.

and virtual reality specialist Division Ltd., plus academic partners from the universities of Manchester, Nottingliam and Lancaster.

The Virtuosi project has cost \$4.6 million over three years, with the U.K. government supplying \$2.2 million.

"Virtual reality should no longer be seen as merely clever technology for the entertainment and games industry," said Garth Shephard, the CSCW program coordinator. "Its place in business is clear."

Condon writes for the IDG News Service's London bureau.

### ODUCTS

ELECTRONIC

COMMERCE

TELEBYTE TECHNOLOGY, INC. has announced Model 9010 Web Route, an Internet access device that provides full-time connections to the Internet via frame relay or another wide-area networking service.



According to the Greenlawn, N.Y., company, Model 9010 Web Route configures itself automatically for frame-relay

network connection, without advance information from the frame-relay service provider.

The product costs \$995. Telebyte Technology (516) 423-3232 www.telebyteusa.com

PASSPORT CORP. has announced Passport IntRprise, which lets developers build applications that use Java front ends for Internet and intranet deployment.

The Paramus, N.J., company said Passport IntRprise supports transaction processes, a multitier architecture and fault tolerance for enterprises. If a

system fails, the IntRprise application can immediately return to prefailure status. One license costs \$8,995.

**Passport** (201) 634-1100 www.passport4gl.com

WINNOV has announced Videum-Conf Pro, a desktop videoconferencing system for use on the

According to the Sunnyvale, Calif., company, the product includes an audio/video board, VideumCam color video camera and software. It costs \$499.

Winnov (408) 733-9500 www.winnov.com



See users navigate files like Web sites. See intranet crawl from swamp, walk on land.



# ENTERPRISE NT

### AVIION SERVERS MAKE MICROSOFT WINDOWS NT SERVER A TRUE ENTERPRISE PLATFORM.



**Built on decades of enterprise** experience, Data General's AViiON® servers provide high reliability and comprehensive high-availability features that set Intel Pentium® Pro processor-based AViiON servers apart from other NT servers. Enterprise features like: 

CPU and memory deconfiguration = N+1 power and cooling 8-way SMP ■ Data integrity with CLARiiON® storage ■ Multi-path I/O for protection against loss of a controller **■ Clustering capability for protection** against loss of a server and ■ NTAlert <sup>SM</sup> - the industry's only NT-based remote service for early identification of potential problems. That's why the AV 4900 was recently awarded a PC WEEK Labs Analyst's Choice award.\*

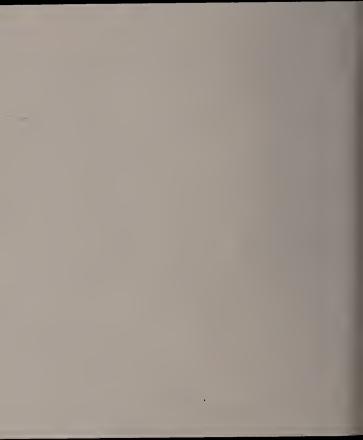
AViiON servers are running enterprise NT applications like SAP, PeopleSoft, and Oracle Financials worldwide. They are ready to run your NT applications today. And if you are running UNIX applications, AViiON servers are still the way to go — same outstanding hardware design; same enterprise features; same service, support and integration from Data General.



www.dg.com 1-800-DATA GEN

\*PC WEEK June 17, 1996





Case Studies + Trends + Outsourcing

A recent poll of 100 network managers at companies that provide Internet access found:

- 64% give in-house users access to custom applications, but only 28% extend this capability to mobile and remote users.
- 13% let customers access client/server applications.
- 40% have established security policies to let in-house users access Java applets.
- 87% said they need to provide sensitive company information via the Internet.

Source: International Data Corp., Framingham, Mass.

Outsourcing skills assessment

# U.S. Cellular calls HP for help

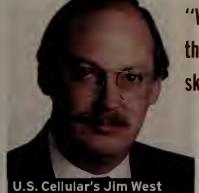
By Thomas Hoffman

Plunge into client/server computing, U.S. Cellular Corp. wasn't sure what skills it needed and how to retrain its mainframe-oriented staff.

But unlike other firms that have struggled to assess their skills gaps internally, U.S. Cellular called in a consultancy.

In doing so, the Chicagobased cellular phone service joins a small but growing list of firms that are reaching outside for that help.

Companies such as U.S. Cellular are assessing their skills base to determine whether they need to recruit employees or retrain existing staff to manage technologies that are



new to them, such as relational databases and Unix applications.

"Not everything [in client/ server] is equivalent to the mainframe world," said Jim West, vice president of information services and chief information officer at U.S. Cellular.

"We found that there's more

"We didn't understand the [required] client/server skill set."

> of a need for a systems software administration function" in client/server than in mainframe computing, he said.

#### **EMERGING TREND**

Skills assessment "is showing up with more frequency" as organizations move from mainframe to client/server computing and recognize the need to fill technical skills gaps that arise as a result, said Robert A. Zawacki, professor emeritus of management and global business at the University of Colorado in Colorado Springs.

Since its customer base grew tenfold in the past five years, U.S. Cellular needed a billing system that could support its more than I million clients and make it easier for marketing and other executives to analyze

customer information.

U.S. Cellular last year selected a suite of financial software applications from Israel-based Amdocs as part of a \$20 million client/server platform.

The company then tapped Hewlett-Packard Co. in Palo Alto, Calif., to help it with skills and retraining assessment.

HP "clearly had a good understanding of our target technical environment" — an HP 9000 Unix platform, West said. That experience helped, but it was really HP's ability to understand U.S. Cellular's business issues that led to the consulting contract, West said.

U.S. Cellular had looked at four or five other consultancies, including Electronic Data Systems Corp., before it selected HP, West said.

HP recommended that U.S. Cellular retrain its 140 legacy systems staff members to run the company's new systems. It also advised the company to implement this training in 1997 and 1998, when U.S. Cellular's new billing system will be phased in. This way, the staff will have a fresh understanding of the technologies as they are rolled out.

U.S. Cellular, page 78

# Briefs

### Service woes

Are you being served? Probably not as well as you should be, according to a survey by Forrester Research, Inc. in Cambridge, Mass. According to the poll results released recently by the consulting firm, 80% of 50 senior IS executives interviewed said they consider customer issues when making technology decisions. But half of those polled make no attempt to coordinate customer data across diverse systems. So different groups in a company - such as order processing and customer service view the same customers differently. Forrester predicts a new type of packaged server application will emerge to solve the problem.

### Fending off year 2000

Boston Mutual Life Insurance Co. has contracted Command Systems, Inc. in Farmington, Conn., to handle the insurer's year 2000 date-conversion work. Boston Mutual has about 3,000 programs and 5 million lines of code to be analyzed. The project is expected totake 19,000 hours of labor.

# Monsanto takes SAP R/3 module for test-drive

Monsanto hopes the

production planning

software will let it

do made-to-order

business.

By Randy Weston

THREE YEARS AGO, chemical manufacturer Monsanto Co. couldn't dream of turning its processing plants into make-to-order operations. But the

company is closer to that goal after it launched a re-engineering effort that included tying plant floors to other business processes with client/server technology.

Bob Barrett, director of world-wide operations and finance at Monsanto, said the company's supply chain was linked only loosely to its business plan. "It was difficult for a global business manager to see what we had in inventory around the world on any given day. You couldn't commit to an order without three or four days of phoning and faxing plant floors," Barrett said.

So the St. Louis-based compa-

ny began a three-year migration from a mix of mainframe and other legacy systems to client/server technology — specifically SAP AG's R/3 Version 3.0, which includes human resources, financials and manu-

facturing applications.

The R/3 manufacturing program included an untried module called production planning for the process industry (PPPI).

The PPPI module, which was designed to allow Monsanto to become more of a make-to-order company, was installed at Monsanto's largest and most critical plant, a fiber manufacturing site in Pensacola, Fla. The plant makes nylon and other fibers for carpet makers and similar industries. Barrett said the Pensacola plant was the environment in which the company wanted to test the system be-

Monsanto, page 78

### **INVESTMENT TECHNOLOGY TIPS**

In The Handbook of Investment Technology, editors Kevin J. Merz and Joseph Rosen cite a checklist of key success factors in projects designed to yield a competitive advantage for investment firms. These factors include:

- Active senior management support
- Appreciation of IT's critical role
- A strong leader to champion the project
- Corporate culture that rewards teamwork
- IT staff that understands the business
- IT and business staffs that don't conflict
- Adequate up-front planning
- Synchronized business and IT strategies
- Avoiding investing in technology for only the latest "bells and whistles"
- End-user trainers knowing the business as well as IS
- Doing post-installation appraisals
- Knowing IT is a tool, not a substitute for human judgment

Source: The Handbook of Investment Technology, Irwin Professional Publishing, Chicago, 354 pages, \$70

# Say it ain't so, Joe

CONTINUED FROM PAGE 3

Two weeks and a mere \$2,000 or so later, the vendor had all the information it needed to seal a \$500 million deal with the company. The buyers who spilled their guts in the interviews simply figured they didn't get the job.

"This is not far-fetched. This kind of thing is more common than you think, especially when you're talking about billions of dollars," says Orlando, a former high-tech sales executive turned tireless consumer advocate.

Orlando says he hasn't personally witnessed such scams. But during his career, Orlando has collected this and other war stories from sales teams that represent a variety of vendors.

By now, Orlando is hoarse from evangelizing. His listeners, for the most part, sit dumbfounded. This is pretty much the norm after one of Orlando's "buyerbeware" spiels.

"I'm always being told by buyers that they didn't know these things. To me, it's amazing that they don't know what they don't know," Orlando confides in a subsequent interview.

### TRICKS OF THE TRADE

Orlando cites two other not-so-uncommon tricks. One is "Dumpster diving" literally sorting through a customer's trash for tips that might help a vendor

Vendors also have been known to offer users free preventive maintenance checks. During these service calls, a technician copies information on users' C drives, then hands it to the vendor.

These ploys "unfortunately show vendors in a bad light," but they nevertheless

happen all the time, Orlando says.

After more than a decade on the vendor side — first as a worldwide marketing director at Digital Equipment Corp. and later as head of his own valueadded reseller firm — Orlando now advises users how to steer clear of bad deals.

Orlando works out of his own consulting company in Lake Mary, Fla., and as a consultant at International Computer Negotiations, Inc. (ICN) in Winter Park, Fla.

"In a sales situation, it's a matter of trying to read a person. The more a customer talks, the more they tell you how to sell them,' he says.

"If you get an arrogant

type, you've got to be cocky and arrogant back. Arrogance tends to draw people in. They figure you can't keep making statements without there being something to them," he says.

Through the years, Orlando says, he got very good at reading people and selling. But he didn't like how manipulative he had become and how callous he felt about his sales targets.

Orlando says he ultimately developed a dual persona.

Here he was a docile, quiet man at heart — someone who likes to spend his spare time with his three sons or landscaping his backyard.

Yet, he figures, lots of people could just as easily picture him "as an arrogant Mafia type, having drinks on the back of a yacht somewhere."

Then about 18 months ago, ICN invited Orlando to address a group of IS buyers. He has worked exclusively on the buyers' side of the bargaining table ever

#### **DISTINGUISHED LIST**

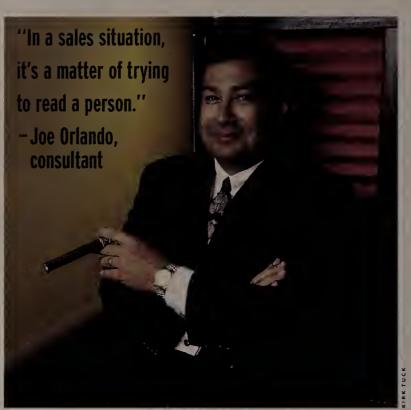
Orlando's client list includes long-

distance carrier Sprint Corp., drug giant Merck & Co. and mail-order retailer L. L. Bean, Inc.

"At first I had a hard time understanding what value he brought because he was very quiet and wellbehaved," says one client, who is in the midst of negotiating a multibillion dollar outsourcing deal.

"But once we started to work through individual [contract] issues, I really got a sense not only of his [negotiation] skills, but his commitment," the client

"When our original contract expired with ICN, we renewed it, but we made it clear that we wanted Joe on the project for as long as possible," he says.



### Monsanto

CONTINUED FROM PAGE 77

fore it was rolled out in other units.

With the new function, Monsanto hoped to better link the manufacturing plant to other parts of the business process and eventually save money by reducing inventory. The nature of the chemical processing business won't allow Monsanto to become a total make-to-order business, but Barrett said it is changing the way employees at the Florida plant view their jobs.

### **CONNECTION MADE**

The application "allows us to link planned orders — whether forecasted or actual orders from our customers - to the shop floor. So we are making something for a customer rather than making it and then seeing who we can sell it to. Every order that comes down now has a customer," he said.

The module went live Oct. 1, but not without a lot of scrambling to fix a "staggering amount of bugs we weren't expecting" and "killer long hours" to meet the deadline, Barrett said.

"When you implement SAP, especially PPPI, you are building recipes. You are configuring modules to model the recipes or process," Barrett said.

He said the bugs were mainly due to the immaturity of SAP's application link enabling (ALE) messaging technology, which allows its modules to be installed on different servers instead of one. But he said SAP wanted the PPPI module to succeed at Monsanto; the chemicals manufacturer is considered a showcase installation. As a result, SAP engineers from the U.S. and Germany also worked overtime to clean up the software.

SAP has traditionally responded to the needs of its showcase customers, observers said. The ALE middleware messaging technology was an attempt to answer demands by high-profile beta tester Chevron Corp. in San Ramon, Calif.

The PPPI module was developed because of the process manufacturers' demands for such functionality.

### U.S. Cellular

CONTINUED FROM PAGE 77

West said U.S. Cellular expects to spend about \$1 million to retrain its information systems staff in the next two

That rollout approach made sense to Jodi Voy, an applications analyst at U.S. Cellular. "The concern was, 'Let's do the training at a point in time when you can

apply it'," she said.

Voy will continue in her role as a member of the new billing system test team before she is trained to become an Oracle database administrator. That will happen after a user-acceptance test period in the second half of next year.

"People need to see that the company is concerned about their career growth and future," said Voy, an eight-year veteran of U.S. Cellular. "I'm real excited

## MEDICAL ALERT...

### Ulcers Tied to Unix "vi" Editor



Can't stomach another editing session? Use the Unix editors languages that worked for you on the mainframe.

uni-XEDIT cms-style Editor with Full Macro Support

uni-SPF ispf-style Editor, Browse, Utilities, .... even Dialog Mgmt!

uni-REXX Portable System Control and Macro Language



800-228-0255 sales@wrkgrp.com http://www.wrkgrp.com

# DIAXA Enough! PENTIUM PRO www.amdahl.com

Today, you face an endless swarm of desktops, sites and applications, each draining your precious IT resources. Planning. Deploying. Integrating. Training. Supporting. Migrating.

Amdahl delivers integrated technology solutions across and between all major enterprise platforms — including all the professional consulting, integration and support services you need.

For S/390, it's our Millennium™ family of CMOS-based servers and Spectris™ storage systems. For Windows NT°, it's our EnVista™ servers and LVS 4500™ storage systems. For UNIX°, we offer Ultra Enterprise™ servers and our proven UTS° operating system for mainframes. All united with cross-platform connectivity and our A+ Software™ Application Management suite. Amdahl does it all, data center to desktop, start to finish.

Call Amdahl for a SWAT team over 10,000 strong, passionately committed to your success.

Contact us at (800) 223-2215 or www.amdahl.com

© 1996, Amdahl Corporation. Amdahl and UTS are registered trademarks and Millennum, Spectris, EnVista, LVS 4500, A+ Software and BRING US YOUR HARD PROBLEMS are trademarks of Amdahl Corporation. S/390 is a registered trademark of IBM Corporation. Windows NT is a registered trademark of Microsoft Corporation. Ultra and Ultra Enterprise are trademarks of Sun Microsystems. UNIX is a registered trademark in the United States and other countries (except in Japan where such license is non-exclusive) through X/Open Company Limited. The Intel Inside logo and the Pentium are registered trademarks and the Pentium Processor Logo and the Pentium Pro Processor Logo are trademarks of Intel Corporation. All other trademarks and products are the property of their respective owners.

BRING US YOUR HARD PROBLEMS

# This kind of editorial quality...



Weblitasters and the control of the

### Computerworld

For more than 29 years,
Computerworld has been the
primary source of information on
information technology for the
enterprise. That's why thousands
of IS professionals read
Computerworld every week.

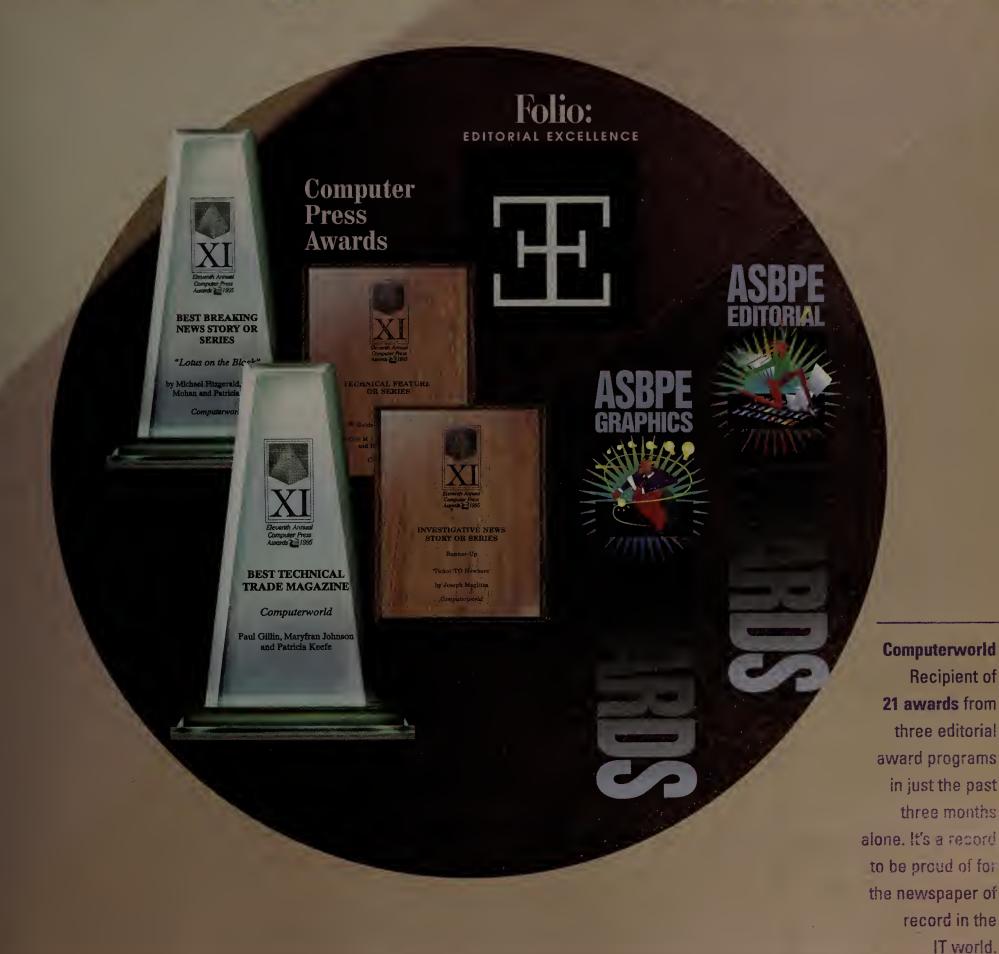
### Computerworld Global 100

A Supplement profiling outstanding information technology users through out the world. These organizations—from global corporations to government agencies—are defining how global business will be conducted in the future. Translated into 13 languages, distributed in 23 countries.

### **Computerworld Campus Edition**

The Computerworld Campus
Edition is an annual magazine
written specifically for, and distributed
only to, top IT students at U.S college
campuses.

# leads to these kinds of awards.



**Computer Press Awards** lune 19, 1996

Best Technical Trade Magazine Computerworld 8/28 & 11/6/95

Best News Story Computerworld "Lotus on the Block" 6/12/95

Runner Up Best Investigative News Story Computerworld "Ticket to Nowhere" 12/11/95

Runner Up **Best Technical Feature** "The Computerworld Guide to High-end Desktop PCs" Folio's Magazine's Editorial Excellence July 11, 1996

Winner: Computing Trade **Publication Category** Computerworld 8/28/95

**Press Editors - Nationals** August 2, 1996

Editorial Category:

First Place: News Series Computerworld "Win 95 Off and Running" 2/95 - 8/95

Second Place: News Series Computerworld "Lotus on the Block" 6/12/95

Graphics Category:

First Place: Computergenerated Infographic Computerworld Client/Server Journal's "Document Management" 2/95

American Society of Business First Place: Opening Page Spread Computerworld's In Depth Feature, "Swamp Thing" 8/7/95

> Second Place: Front Cover, Non-photo The Computerworld Global 100 magazine 5/1/95

Second Place: Contents Page Computerworld's Campus Edition magazine. 10/31/95

**Honorable Mention: Opening Page Spread** Computerworld's Management Feature, "Buried Alive" 12/11/95

American Society of **Business Press Editors -Northeast Regionals** July 23, 1996

First Place: Front Cover Non-Photo The Computerworld Global 100 magazine 5/1/95

First Place: **Contents Page** Computerworld's Campus Edition magazine 10/31/95

First Place: Opening Page/Spread Computerworld In Depth Feature, "Swamp Thing" 8/7/95

First Place: News Series "Win 95 Off and Running" 2/95 - 8/95

Second Place: News Series "Lotus on the Block" 6/12/95

Second Place: Opening Page Computerworld's Management Feature, "Buried Alive" 12/11/95

Second Place: Regular Department Computerworld's Management Feature, "Buried Alive" 12/11/95

Third Place: Regular Department Computerworld "Training for MIS Failure" 12/11/95

Honorable Mention:

Computerworld Client/Server Journal "DCE Delivers" 12/11/95



At Sun Microsystems, we help businesses build, manage and profit from enterprise network computing. Continually, we translate our networking leadership and expertise into products, technologies and services that give our customers enterprise solutions and discrete competitive advantages. It's no surprise that we offer a broad portfolio of support, education and integration services on a global scale. So through our Professional Services organization, we can help you plan your implementation and get maximum effectiveness from your network. And we're the industry's largest UNIX® education organization, with over 50,000 students trained every year. Once you've installed your solution, you'll be pleased to know that we support more than 500,000 systems in 130 countries worldwide. Which goes to show, if you want the best information system, shouldn't you also want the company that can help you microsystems.

The Computer are trademarks or registered trademarks or registered trademarks and other countries. UNIX is a registered trademark in the United States and other countries, and the Winted States and other countries, exclusively licensed through X/Open Company, Ltd.

# SOUND-OFF: Is it time

SOUND-OFF: Is it time to panic? In Depth, page 96 →

Which IS professionals stand to gain from conversion projects, and why? IT Careers →

# THE

Managing

It's Dec. 9, 1996. Do you know where your year 2000 problems are?

If not, you had better get cracking. Most practitioners and consultants say if you aren't well into finding the problem code by now — let alone fixing it — then you aren't going to finish in time. That he call the latest the latest

Bruce lesearch directions that the difference between the search direction of the search direction. Inc., recommends the ding the time horizon to failure" for the application. A system that handles twe-year loans, for instance, may have already stumbled on the difference between 1901 and 2001.

need time for testing and rein pand, and a buffer period in which we a swat the inevitable last-minute bugs

There are only nine business quarters until Jan. 1, 1999, when smart companies should have completed conversion and testing. On the following pages are the major decisions you should be making now to prepare for the millennium and some suggestions on how to make those decisions.

The road to 1/1/00, page 84

IS professionals such as T o's Fred cal choices to make as they help guide down the path to the

Robe L. Sche

HOW GFT THE

Do you have the support of the CEO and the board?

### YES

- Explain in detail the business risks, including lost revenue, opportunity cost, loss of public image, corporate and personal liability.
- Make sure management's support is public and consistent. The work is too risky, expensive and complex to complete otherwise.
- If the company is public: Discuss the risk of shareholder lawsuits or a drop in stock price if unsolved year 2000 problems hurt earnings and share price.

### NO

- Hire a respected consultant to deliver the bad news.
- ■Prove that competitors and wellrun companies in your region also are spending for year 2000 fixes.
- ■Quote trade press and industry gurus on the seriousness of the problem.
- ■Show graphically which parts of the business will fail if the problem isn't fixed. Demonstrate the impact on revenue and profits.
- ■Conduct one-onone meetings; prepare examples of applications that failed because of year 2000 issues.

acking for year 2000 work ideally should come from either the CEO or chief financial officer, says Lee Freeman, manager of the year 2000 practice at Management Support Technology, a consulting firm in Framingham, Mass. Otherwise, he warns, the work can fall victim to penny-pinching from business managers who have learned not to trust information systems' cost estimates.

All too often, the IS professionals who ask for year 2000 funds are "the same ones who have overcommitted, underperformed and [were] never on time" in the past or those who have submitted inflated IS budgets knowing they would be cut, Freeman says. That makes the business manager think "IS is telling me \$50 million; I know deep down it's \$35 million. As you go up the organization, everyone's throwing their own reality fudge factor into it," Freeman says.

Ascent Logic Corp. in San Jose, Calif., claims its Year 2000 Plus tool and methodology lets IS managers create a graphical - and frightening - picture of which parts of the business will fail because of year 2000 problems, and at what point. If the CEO demands a lower price tag, "We say 'Fine.' enter the new numbers, and the picture shows what other parts of the business will fail. Once they understand it's a business problem, then the money is forthcoming to fix it," says Larry McArthur, president and CEO of Ascent.

Freeman and many other year 2000 consultants recommend convening a task force or program office with enough high-level backing to break through political and funding problems. "This group has to be able to break the rules," he says, such as paying extraordinary incentives to attract hard-to-find programmers for year 2000 work. The year 2000 program manager should report "straight to the CEO," Hall says, so he can enforce tough decisions such as spending on the work even if it will tank an operating unit's short-term financial results.

HOW

DOI

FIX

DATE-FIELD **EXPANSION.** Consider expanding the date flelds In the database from slx to eight digits to accommodate four-digit years if:

- The application has a long life expectancy.
- The application is heavily datedependent.
- You have the time and money to expand the database.
- You're dealing with relatively small amounts of data or dates that are spread out widely over time.

MONEY?

WHAT

DO I FIX,

JUNK

B Can I From F I had had a

### CONSIDER REPLACING THINGS IF:

- ■Platform (hardware or software) costs are rising.
- Maintenance costs are rising.
- You understand the business needs and have the development skills to rewrite, test and deploy the system by the year 2000.
- Business process re-engineering has created demand for new functionality, and conversion can be cost-justified as part of the new application.
- ■Upgrade costs are steep for moving to year 2000compliant versions

of vendor-supplied applications or operating systems.

■The year 2000 fix can be achieved by speeding up an already-planned upgrade to new system.

### CONSIDER JUNKING THE SYSTEM IF:

- ■It doesn't meet current or nearterm business needs.
- ■Other systems exist that provide enough of the same functionality to fill the gap.
- ■It's possible to consolidate the system with another one, even if it means giving up

some bells and whistles.

### CONSIDER FIXING THINGS IF:

- ■The application is critical to the business.
- It is highly datedependent (such as for loans processing or insurance applications).
- The system is well-understood and well-documented, which will make the year 2000 fix easier.
- ■The system has a long life expectancy and runs on platforms that you expect to continue supporting for a long time.

ometimes, year 2000 assessments can spell good news. Consider the commercial insurance business at Kemper Corp. in Long Grove, III.

The company has already fixed a key system at onethird of the estimated cost, says year 2000 project manager Pam McFadden.

Apollo is an off-the-shelf package on which Kemper relies to support half its commercial lines of insurance business. It includes 40 million lines of code, 7,400 object modules and 40 databases. By using Challenge 2000 from Micro Focus, Inc. in Palo Alto, Calif., to analyze the code, "we were able to remove two-thirds of the programs" because they weren't being used, McFadden says.

That hadn't been done earlier because it didn't seem important, McFadden says. But it was done this time, because it helped cut the year 2000 work down to size, she says.

WHAT **PARTS** SHOULDI **OUTSOURCE?** 

LOGICAL WORK-AROUNDS. Consider continuing to store dates in the six-digit MM/DD/YY format, but adding application logic that can differentiate between the 1900s and 2000s if:

- ■The system has a limited or uncertain life expectancy. (Logical workarounds may pose long-term maintenance problems.)
- ■The system isn't heavily date-dependent.
- ■The system doesn't deal with many dates that span more than 100 years. (Some workarounds have trouble with sorting years past that time.)

HYBRID APPROACH. Consider storing dates in a new format within the existing six digits - for example, as the number of years since 1800 - and using application logic to calculate the actual date if:

- ■The system will be used for a long time and must span a wide range of dates.
- Database expansion would take too much time or money.
- You can easily find and isolate existing datecalculation logic and tweak it for year 2000 purposes.

on't try to find a silver bullet for your year 2000 problems, analysts say. The correct fix will vary by the structure of your systems, how heavily they use dates, the way they use dates, the age of the application and the skill level of your IS organization.

Changing the database is the more complete answer, but it can be far more difficult and expensive to do. Logical work-arounds can be done faster, analysts say, but the procedural code that can be added to applications can drain performance and become a long-term maintenance night mare. The hybrid approach can avoid the cost of database expansion, make long-term maintenance easier and handle a wide range of dates. But it's best used only when it's easy to isolate existing date-calculation logic and add the capability to calculate correct dates.

Even within the same company, different approaches are best for different applications. Associate IS specialist Fred Friedrich is using a hybrid approach he developed for the core financial applications at Texaco, Inc. in Houston. But for the core accounting applications at Texaco's exploration and production unit, Dennis Samoska, manager of applications, is piloting a year 2000 fix that employs the database expansion route.

One reason: Changing all the date calculations would have been harder in Samoska's collection of more than 100 different applications that "were all developed at different times, designed by different people over a range of 20 years," Samoska says. "Many of Fred's applications were built around ... one system."

### **CONSIDER OUTSOURCING** PROJECT MANAGEMENT IF:

- ■Your in-house project managers have never proved themselves on a project this big, complex and critical.
- At least one person in your organization has the clout, skill and experience to manage the project manager.
- ■Someone in your firm remains accountable for the overall project.

### CONSIDER OUTSOURCING THE **CONVERSION ITSELF IF:**

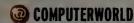
- You've done a solid, complete inventory and analysis with results the vendor can easily understand.
- You and the vendor have agreed on a compliance measure so both sides know what "completed" means.

utsourcing the work has all the potential benefits and risks of any outsourcing deal. But the needs for good communication, coordination and conflict management are even more crucial because of the work's complexity and

An outsourcer's "timetable may impact your timetable" for everything from routine overnight batch jobs to taking systems off-line for conversion and testing, says Richard Saulsgiver, a senior technical manager at Computer Management Consultants, Inc., a consulting firm in Tampa,

"The key is knowing the activities, knowing the schedule and holding them to the schedule." And that requires that one of your key managers be involved, he says.

Scheier is Computerworld's senior editor, management.



For more year 2000 advice, log on to www.computerworld.com



### **YEAR 2000** 1118 SCOREBOARD

An occasional series on year 2000 trends, issues and statistics

### MILLENNIUM PRICE WATCH

artner Group, Inc.'s latest estimate for the cost of fixing the year 2000 problem is \$1.10 per line of executable Cobol code. Gartner believes Cobol makes up 80% of the problem code. This assumes use of the "logic" method to fool the system into thinking dates have been changed in the database. The cost increases to \$1.65 per line of code if customers actually expand date fields.

These estimates include the cost of making people aware of the problem; finding, fixing and testing any affected code; and managing the project. The estimates don't include extra processing power or storage required for year 2000 conversion or testing.

The estimates have an accuracy margin of plus or minus 40% and should be used only for preliminary estimates, Gartner analysts warn. Actual costs depend on factors such as the complexity and age of affected applications and the skill level of the IS staff.

### **WHO YA GONNA BELIEVE?**

How are companies progressing with their millennium conversions? You may get an idea from the results of four recent studies:

#### ■ APPLIED COMPUTER RESEARCH, Phoenix

Field: 117 respondents, largely managers of software development. The skinny: 68% say their companies have started to convert or are planning to convert systems.

■ INTERNATIONAL DATA CORP., Framingham, Mass. Field: 503 top executives, including some year 2000 project managers. The skinny: Nearly 75% of firms have begun or planned projects.

### ■ RHI CONSULTING, Menlo Park, Calif.

Field: More than 200 CIOs from companies with more than 100 employees. The skinny: 35% said their firms would be affected by the date problem. Of those respondents, 47% said they have taken action on it; 47% haven't.

■ SOCIETY FOR INFORMATION MANAGEMENT WORKING GROUP The field: 162 IS executives.

The skinny: About 67% indicate their firms have begun inventory and impact analysis.

### REPAIR — AND RETURN ON INVESTMENT, TOO!

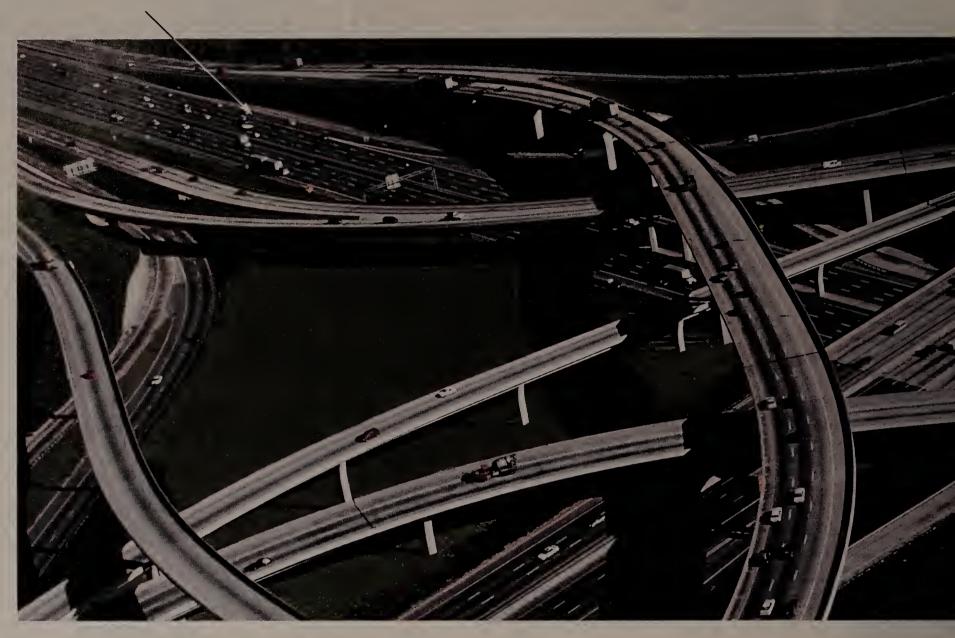
Spending to fix year 2000 problems is bad enough; not getting any return on your investment is worse. Matt Hotle, research director at Gartner Group, suggests a better way: Fix the problems, but at the same time improve either the applications or how you maintain them.

For example, Hotle says, the IS organization can survey users before starting year 2000 work to find functions that can be easily added to the system. Another method: Use your year 2000 inventory to help find and fix bugs in the system, reducing future maintenance work. Yet a third approach is to reuse the test procedures needed for year 2000 conversions in future projects.

Mary Overman at First Data Resources, a credit-card processor in Omaha, is confident he will see such benefits. Even before he started his year 2000 work, Overman had been using the RDD-100 systems engineering tool from Ascent Logic in San Jose, Calif., to create a detailed map of which First Data systems support different parts of its business. For each customer, RDD-100 records "exactly which reports they get, which screens they get, which transactions are associated with those, and which files we send them," says Overman, director of requirements management and verification.

He says this analysis makes it easier to find and fix year 2000 problems and will make it easier to make future changes to its systems. — Robert L. Scheier

### Now We Have A Way To GET YOU FROM HERE



You are here. Your network is sprouting up like

working products. And like all great products, ours

an out-of-control weed here, here, here

and here. And it's probably not going to stop growing any time soon. Clearly, what's needed here is a solution that can keep pace with your expanding enterprise.

started with great companies. By making

This is the Compaq Netelligent 8500 Communications Platform. (But you can just ask for our new router.)

Thomas-Conrad and Networth part of Compaq, we're able to combine their industry-leading products with

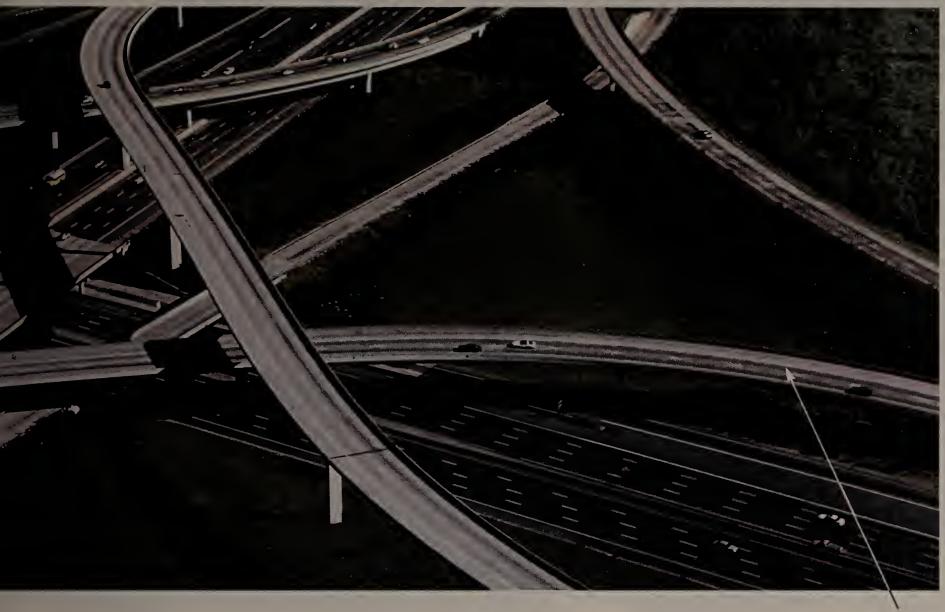
our networked computer experience.

And provide you with high-quality,

Compaq Netelligent is our complete line of net-

highly reliable solutions for your network.





TO HERE.

Solutions like our new Netelligent routers. Based on CiscoIOS™ software, and developed in partnership with Cisco Systems, our routers are not only highly scalable, they're highly affordable. (Just right for your expanding network.) And as it grows, we think you'll appreciate features like multiple expansion slots and a uniquely designed service tray that helps reduce maintenance costs. And because they're based on open standards, our

routers are easy to integrate into your existing system.

Of course, as good as they are, Netelligent routers are just one part of our complete line of networking products. To find out more about Compaq Netelligent, visit our Web site at www.compaq.com.

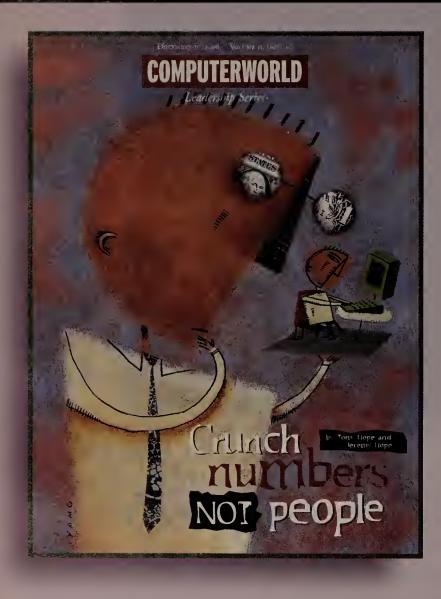
A network that runs like clockwork? Who says you can't get there from here? Certainly not us.



# DON'T MISS COMPUTERWORLD'S LEADERSHIP SERIES

**A Special Monthly Editorial Supplement** 





### Previous Articles Available

Governance: The New IS Agenda by Paul A. Strassmann The Role of the CEO in IT Decisions by Bill Carico Transforming the CIO by Thomas H. Davenport Knowledge, Information, Learning and the IS Manager by Christopher Gopal and Joseph Gagnon Into the Infocosm by Glover Ferguson The Eastern Road to IT by Shuji Honjo The Enterprise Engineer by James Martin Building an IT Management Flight Deck by Howard A. Rubin Rebuilding the IS Organization by Robert A. Zawacki The Recentralization of IT by Ernest M. von Simson The New CIO/CEO Partnership by Harry M. Lasker and David P. Norton Evaluating the CIO by Thomas J. Buckholtz Staffing for the Future: A Leadership Roundtable by Bruce Rayner Chaos and the IS Executive by Christopher Meyer The New Organizational Operating System by N. Dean Meyer The Future of Moore's Law by Gordon E. Moore and Bruce Rayner Assembling the Renaissance Executive by Julia King and Robert L. Scheier The Internet: Managing the Connection by Randy Weston

The Hidden Traps of IT Transformation by Ann Senn

To Request a Copy of Previous Leadership Series Articles Contact Sharon Bryant, Computerworld reprints manager, (508) 820-8125, fax: (508) 875-0733, or email her at sharon\_bryant@cw.com. Copies of previous Leadership Series articles are available for \$4 each plus postage.

Coming in the December 16th issue of Computerworld...

# Crumch Mumbers, Mot People

Layoffs wreck morale and lower the quality of work. But IS executives can cut costs without layoffs, if they think in terms of processes and activities instead of departments and salaries. Tony and Jeremy Hope, authors of the new book *Transforming the Bottom Line: Managing Performance with the Real Numbers*, turn their sights on IS organizations, and show how IS managers can keep their staff when they're under pressure to reduce costs.

Published by:

COMPUTERWORLD
The Newsweekly for Information Technology Leaders

Sponsored by:



# COMPUTERWORLD

Yes, I want to receive my own copy of COMPUTERWORLD each week. I accept your offer of \$39.95\* per year - a savings of over 73% off the single copy price.

First Name	MI	Company		Last Nama		
Title	Company			E-mail address		
Address		City	State	Zip		
Address Shown: ☐ Home ☐ Business ☐ Ne	w ☐ Benew Single copy price: \$3.00	Nissue	*U.S. Only Cenede \$95 Mexico Central/Sc	outh America \$150	Furone \$295 ell other countries \$295	

### Please complete the questions below.

#### 1. BUSINESS/INDUSTRY (Circle one)

- 10. Manufacturer (other than computer)
- 20. Finance/Insurance/Real Estate
- 30. Medical/Law/Education
- 40. Wholesale/Retail/Trade
- 50. Business Service (except DP)
- 60. Government State/Federal/Local
- 65. Communications Systems/Public Utilities/Transportation
- 70. Mining/Construction/Petroleum/ Refining/Agriculture
- 80. Manufacturer of Computers, Computer-Related Systems or
- 85. Systems Integretors, VARs, Computer ervice Bureaus, Software Planning & Consulting Services

- 90. Computer/Peripherel Dealer/Dist./
- 95. Other
  - (Please specify)

### 2. TITLE/FUNCTION (Circle one) IS/MIS/DP MANAGEMENT

trade C1

- 19. Chief Information Officer/Vice President/ Asst. VP IS/MIS/DP Manegement
- 21. Dir./Mgr. MIS Services, Information
- 22. Dir./Mgr. Network Sys., Data/Tele. Comm., LAN Mgr./PC Mgr., Tech. Planning, Administrative Services
- 23. Dir./Mgr. Sys. Development, Systems Architecture

- 31. Programming Management, Software Developers
- 41. Engineering, Scientific, R&D, Tech. Management
- 60. Sys. Integrators/VARs/Consulting Mgt.

#### CORPORATE MANAGEMENT

- 11. President, Owner/Partner, General Mgr.
- 12. Vice President, Asst. VP
- 13. Treasurer, Controller, Financial Officer

### DEPARTMENTAL MANAGEMENT

- 51. Sales & Mktg. Management70. Medical, Legal, Accounting Mgt.

#### OTHER PROFESSIONAL MANAGEMENT

- 80. Information Centers/Libraries, Educators, Journalists, Students
- 90. Other Titled Personnel

Do you use, evaluate, specify, recommend, purchase: (Circla all that apply)

#### Operating Systems

- (e) Mac OS (f) Windows NT (g) Windows
- (a) Solaris (b) Netware (c) OS/2
- (d) Unix (h) NeXTstep
- App. Development Products ☐ Yes ☐ No Networking Products ☐ Yes ☐ No
- 4. Which of the following software products do you buy, specify, recommend or approve the purchase of?
  - (e) ☐ Internet software (b) ☐ Internet browsers

  - (c) Web authoring/development tools
    - B4&6 D

# COMPUTERWORLD

Yes, I want to receive my own copy of COMPUTERWORLD each week. I accept your offer of \$39.95\* per year - a savings of over 73% off the single copy price.

First Name	MI			Last Nama		
Title	Company		E-mail eddrass			
		City	State	Zip		
Address Shown: T Home T Business	C New C Benew Single conv	nrina: \$3 M/iceus	*II S Only Conada \$95 Mavico Con	ral/South America \$150 E	urone \$295 ell other countries \$295	

Please complete the questions below.

### 1. BUSINESS/INDUSTRY (Circle one)

- 10. Manufacturer (other than computer)
- 20. Finance/Insurance/Real Estate
- 30. Medical/Law/Education 40. Wholesale/Retail/Trede
- 50. Business Service (except DP)
- 60. Government State/Federal/Local
- 65. Communications Systems/Public
- Utilities/Transportation 70. Mining/Construction/Petroleum/ Refining/Agriculture
- Manufacturer of Computers, Computer-Related Systems or Peripherals
- 85. Systems Integrators, VARs, Computer Service Bureaus, Software Planning & Consulting Services

- 90. Computer/Peripheral Dealer/Dist./ Retailer
- 95. Other\_

trade CJ

(Please specify)

#### 2. TITLE/FUNCTION (Circle one) IS/MIS/DP MANAGEMENT

- 19. Chief Information Officer/Vice President/ Asst. VP IS/MIS/DP Management
  21. Dir./Mgr. MIS Services, Information
- Center
- 22. Dir./Mgr. Network Sys., Data/Tele. Comm., LAN Mgr./PC Mgr., Tech. Planning, Administrative Services
- 23. Dir./Mgr. Sys. Development, Systems Architecture

- 31. Programming Management, Software Developers
- 41. Engineering, Scientific, R&D,
- Tech. Management

  60. Sys. Integrators/VARs/Consulting Mgt. CORPORATE MANAGEMENT

### 11. President, Owner/Partner, General Mgr.

- 12. Vice President, Asst. VP
- 13. Treasurer, Controller, Financial Officer

### DEPARTMENTAL MANAGEMENT

- 51. Sales & Mktg. Management
- 70. Medical, Legal, Accounting Mgt. OTHER PROFESSIONAL MANAGEMENT
- 80. Information Centers/Libraries, Educators, Journalists, Students
- 90. Other Titled Personnel

- Do you use, evaluate, specify, recom-mend, purchase: (Circle all that epply)

  - Operating Systems
    (a) Solaris
  - (e) Mac OS (f) Windows NT (b) Netware
  - (c) OS/2 (g) Windows
  - (d) Unix (h) NeXTstep
  - App. Development Products Yes No Networking Products Yes No Networking Products Intranet Products
- 4. Which of the following software products do you buy, specify, recommend or approve the purchase of? (Please check ell that apply)
  - (e) Internet software
  - (b) Internet browsers
  - (c) Web authoring/development tools
    - B4&6 D

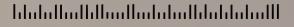
### **BUSINESS REPLY MAIL**

FIRST-CLASS MAIL PERMIT NO. 55B MARION OH

POSTAGE WILL BE PAID BY ADDRESSEE

### **COMPUTERWORLD**

P O BOX 2044 MARION OHIO 43306-4144 NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES





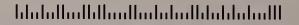
### **BUSINESS REPLY MAIL**

FIRST-CLASS MAIL PERMIT NO. 55B MARION OH

POSTAGE WILL BE PAID BY ADDRESSEE

### **COMPUTERWORLD**

P O BOX 2044 MARION OHIO 43306-4144 NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES





# **SOFTWARE:** SO BAD, IT CAN **ONLY GET** BETTER



Software easily rates among the most poorly constructed, unreliable and least maintainable technological artifacts ever invented — with the exception, perhaps, of Icarus' wings.

Nobody would tolerate telephones that crash every other day. Nobody would buy a house if taxes and upkeep were seven times the purchase price. But these are the analogies executives think of when IS developers explain why it's hard to implement an important new technology. No wonder executives become exasperated.

Still, there's always a champion who demands that IS develop a computer application. What the champions and their followers don't understand is that applications become increasingly difficult to service over time as endless upgrades and so-called maintenance replaces what was previously constructed at great ex-

Software doesn't physically wear out. It's supposed to improve with use as errors are discovered and corrected. Yet software tends to degenerate much faster than any computer equipment — or any consumer appliance — because of its inherently poor characteristics.

### THE TROUBLE WITH SOFTWARE

Software becomes obsolete because programmers and vendors can't keep up with rapid change coming from many directions. The following are some of the sources of disturbance:

Increasing incompatibility: There's erosion of compatibility in the microprocessor architecture upon which all operating systems are constructed. As hardware moves from 8- to 64-bit processors, software must be adapted accordingly. As communication speeds quicken, the concept of what must be processed centrally and what can be handled locally undergoes radical change. The layers upon layers on which applications rest aren't bedrock — they're continually shifting quicksand. It's no wonder that what rests on top is prone to sudden collapse.

Creeping featurism: The software market, with its rapidly changing cast of suppliers, is a rat race fueled by generous advertising allowances, conventions, magazines and clever vendor tactics that support only the latest version of a software package. Under such conditions, programmers have little incentive to create something of more than immediate use. Vendor incentives: A well-established,

dominant vendor has strong economic incentive to ship imperfect software. Frequent upgrades pre-empt competitors that may wish to ship a more reliable product. Besides, the dominant vendor then can charge for maintenance, support and upgrades that are more profitable than the original merchandise.

Unqualified programmers: Even though the market will in due course deliver more stable operating systems, it's unlikely that most programmers will have the incentives to program reliable applications unless management insists on and verifies them. Most business application programming is done by office workers whose competency has never been formally tested. Plumbers, beauticians and truck drivers are subject to tougher certification standards than these self-taught programmers. These

programmers work on unreasonably short deadlines, use mediocre testing and integration tools and report to ill-informed corporate bureaucrats who believe the advertising claims that writing significant applications is as easy as using a spreadsheet.

Short-term thinking: The year 2000 bug is only one example of the shortsightedness of what some claim is a professional occupation. A typical programmer makes hundreds of such myopic decisions. He just follows management's wishes for speedy completion and minimal expense. The only reason the year 2000 bug has attracted so much attention is that it's ubiquitous and has a definite deadline. Millions of other bugs are just as negligent, but they pop up randomly, one location at a time, and probably cost more than the \$300 billion cost of averting collapse in 37 months.

#### A SOFTWARE OPPORTUNITY

Erosion of compatibility, creeping featurism and unqualified programmers result in conditions that are wasteful and onerous. All that must be corrected in due

Competent managers will accept damage to their business only if the effects are insignificant or if a remedy is unavail-

I'm confident that the current state of the software business won't be allowed to continue. The costs are significant and in many cases represent a considerably greater percentage of corporate profits than before.

Sooner or later, some vendor that seeks to gain an inordinate competitive advantage will start selling computer technologies that recognize the total costs of the customer's ownership instead of just the purchase price of what they sell.

The history of technology and competition shows us that quality, reliability and ease of use always prevail. In software's case, that's likely to happen soon.

There are just too many businesses that can't continue to waste money on shoddy programming solutions.

Strassmann can be reached at paul@ strassmann.com. His World Wide Web address is www.strassmann.com

### Efficiency or growth?

hen it comes to making information technology decisions, cost-cutting wins out over growth among consumer goods manu-

But there are indications that the in-



dustry's information systems managers are looking more at how to use IT to expand their companies, according to a new survey by Computer Sciences Corp. (CSC) in Waltham, Mass., and Consumer Goods Manufacturer magazine.

CSC surveyed IS managers at 203 companies.

■Efficiency: 41% said their company's primary mission is to be the most efficient, lowest-cost company. Pressure to reduce overall supply-chain costs was the top issue, at 54%. The top IS strategies are related to that efficiency mission: integrating systems (60%) and re-engineering business processes (49%).

**Growth:** Helping customers define what they want and delivering it to them was the mission of 38% of respondents. Nearly half (49%) said the purpose of IT investments is to support anticipated growth.

### **OTHER FINDINGS**

■Not Web wackos: Only 33% said their companies maintain a site on the World Wide Web. Of those companies, just 5% said they use their sites for electronic commerce. Most use them as online brochures and to obtain customer feedback. But 20% of respondents said they have intranets in use.

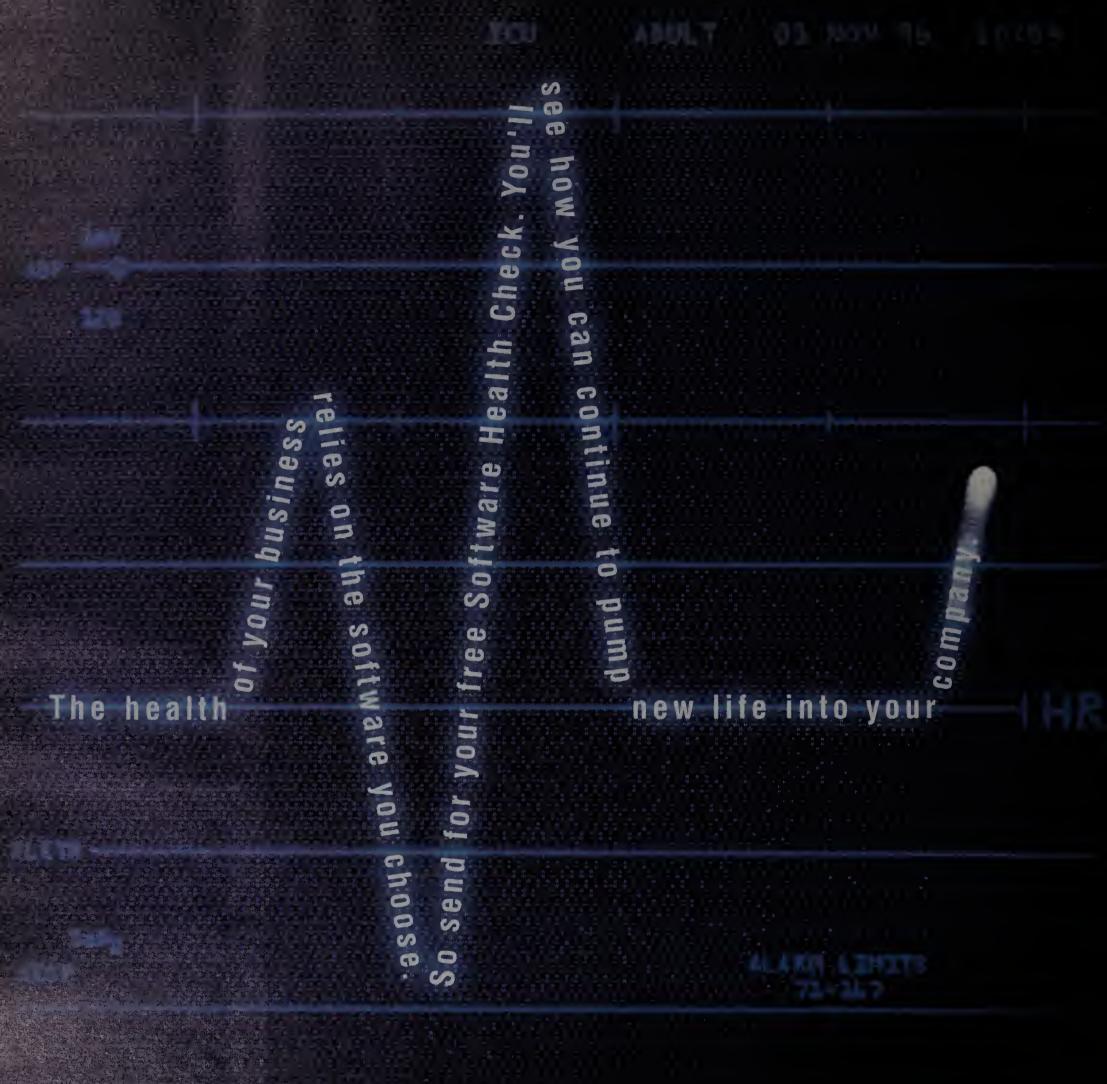
**Analysis fiends:** Four of the top five IT application areas in the next 18 to 36 months are performance measurement, activity-based costing, product flow/ logistics analysis and productivity analysis. (Field sales support was the fifth.)

Copies of the study can be obtained from CSC by calling (800) 272-0018.

### CANA

### CONFERENCES ONLINE

We will no longer run listings of conferences and worksnops for 15 managers. But you can fine them at our Week to Decomputerworld (www computerwards.com).



To get your free personalized Software Health Check Report and see how you compare to your industry's best practices, stop by www.software.ibm.com/info/enterprise/. Your report will be prepared by RONIN Corporation, a worldwide consulting and research firm that is expert at helping companies with strategic, computing and telecommunications issues. It will show you where to concentrate your efforts so you can keep your business operating at peak condition. Now, we promise, this won't hurt a bit....

# Buyer's Guide

PRODUCT REVIEW: Strong performance, low price give Intergraph's server an edge in midrange foray. MY OPINION: Make an animated SPLASH on the Internet.

# USH



Hardware vendors are racing to provide servers that can meet the demands of the converging open systems, client/server architecture and Windows NT markets. The competition has been fueled by the suspicion that a firm that captures the server niche today has the inside track for full enterprise standardization tomorrow.

The vendors' response typically has centered on two technologies: multiple CPUs and RAID storage systems. Intergraph Corp. in Hunts-

The first in an occasional series of reviews of multiprocessor servers

ville, Ala., has stepped into this competition with the InterServe 660, a system that carries the "open" benefits of most NT servers and adds the balanced system performance generally found in traditional, proprietary midrange systems.

The design of the InterServe 660 lets it make full use of the Intel Corp. Pentium Pro processors that power the system rather than The Intergraph push, page 93

BY CURTIS FRANKLIN JR.

# MA Brilliance MAA HILLANDE

Enter your innovative Microsoft® Windows® custom application in the sixth annual Windows World Open,

the international competition that recognizes the best and brightest in Windows based development. If your company has developed a custom application that increased profits, used a legacy system, integrated Internet technology or achieved a higher level of customer satisfaction, you may be just the company we're looking for. Submit your entry by February 10, 1997 and receive the recognition you deserve!

http://www.wwopen.com

Visit the contest web site to download an entry kit, meet last year's winners, and get details about this year's categories which include:

- Administrative Systems
- Business Intelligence Systems
- Core Business Systems
- Customer Service / Customer Support Systems
- Employee Information Access Systems
- Process Control Systems
- Public Information Services
- Workflow Systems and Collaboration Process Systems

Call 800-829-4143 or 206-443-3329 or email wwo@jcai.com for more information.

Sponsored by:

Microsoft

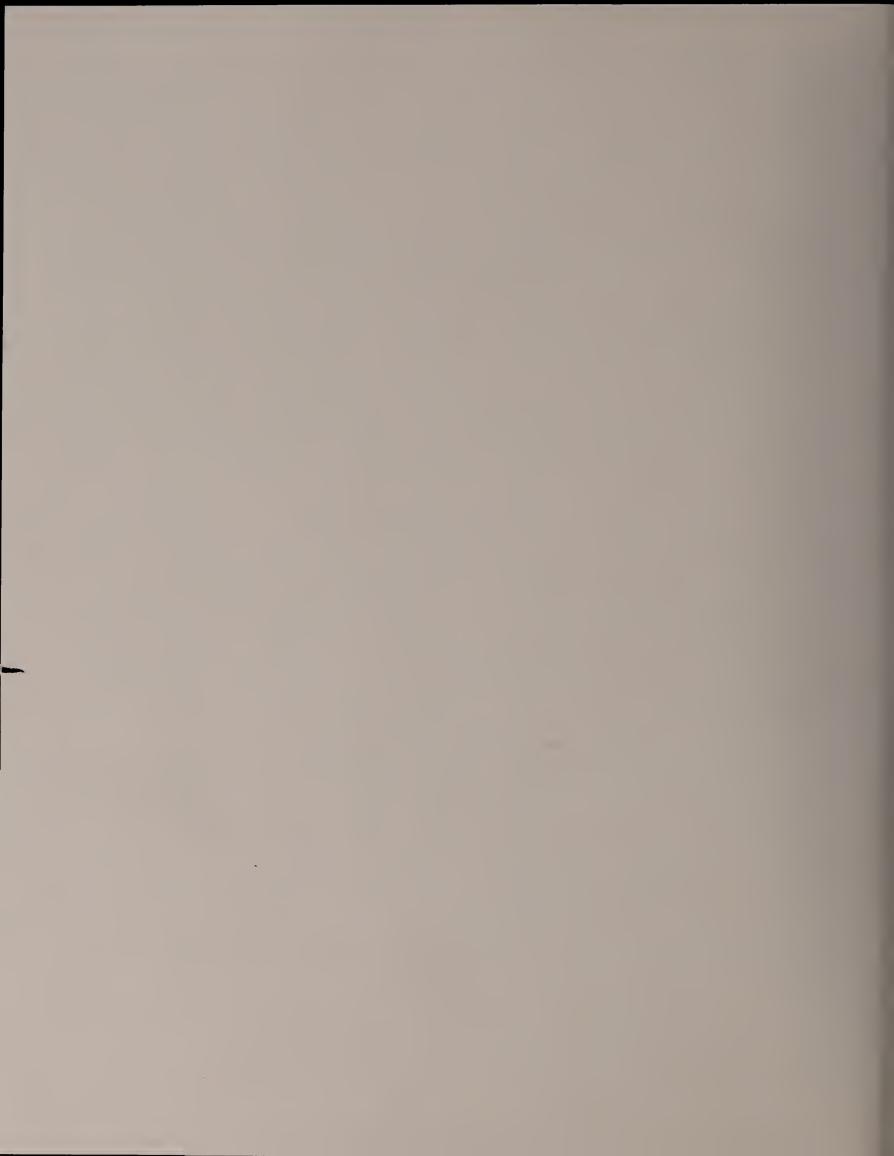
COMPUTERWORLD

SOFTBANK COMDEX.

WALL







#### M T O E I N T O N

#### Make an animated SPLASH

BY ROSS M. GREENBERG

seem to have lost my productivity. I had it about a week or so ago. It was right here, sitting on my desk, only a mouse click away. Then I discovered the FutureWave (www.futurewave.com) FutureSplash Animator product.

I'm not sure if my productivity was lost instantly or if it escaped while I was preoccupied trying to create the perfect Web page with animation and wondrous graphics. It would have had plenty of time to escape. Even with a Kewl Tool such as Animator, the perfection I seek takes a damned long time to accomplish.

The best way to see what Animator has to offer is to look at Web pages that use it.

Internet Explorer comes with a preinstalled equivalent of a Future-Splash plug-in; there's a freebie plug-in available on the Future-Wave home page



and a cool little Java application that emulates the ActiveX control or the Navigator plug-in. Keep an eye on the Java "control." It is still in beta testing but stands a reasonable chance of being entirely platform-independent in the near future.

From FutureWave's home page, you

can click over to a list of other home pages that use Animator. Some are really interesting examples of what Animator can do. Others seem to be real yawns until examined closely; suddenly you'll wonder, "How'd they do that?"

Animator isn't close to perfection, but you can get an idea of what it can do and how everything looks like a nail when you're armed with a hammer.

# Using such buttons can take a page from the ho-hum to the "wow" state for your end users.

You can sit at The Microsoft Network home page and watch the splash screen. There's a lot of stuff taking place on that page. It is done through Animator and is very impressive. I'm also going to tell you

this wasn't an after-school project. There's a great deal of work apparent in that home page.

Someone who takes the time to discover the goodies this program has to offer can accomplish similar feats and more.

Animator cuts that work down by automating a good deal of the tedious stuff, but not down to zero. The first thing to realize is that animation is time-consuming. If you want your product's logo to do a slow fade-in and then a fade-out as it revolves around your company logo, you have your work cut out for you. I'm still working on doing that myself. I'm not a graphics pro and don't play one on TV, but I'm up to about 15 man-hours, so far, and counting. Gads, I love a challenge.

When you click onto a FutureSplashenabled Web page, your browser will check to see if the appropriate plug-in or control exists and is enabled on your system. If not, the plug-in or ActiveX control gets downloaded automatically from the

FutureWave home page. The animated "movie" (Animator parlance for the animated script, inclusive of animation content) is fed to the control, and some stunning results will appear.

You'll notice that graphics start to display as they are still being downloaded. FutureSplash has an advantage over the interlacing of partial

graphics files you may be used to in that it makes good use of streaming. Long animation sequences will start playing almost immediately. You'll also note that the animation movies are concise, so total download time, even on complex pages, is reasonable.

Interactive buttons are the name of the game with FutureSplash-enabled pages: Each button can have different images for each change of state, from the initial button-up state to mouse-over and but-

ton-hit states, and each change can accomplish functions. Using such buttons can take a page from the ho-hum to the "wow" state for your end users.

FutureSplash uses vector graphics and outline fonts, so there are no jagged edges. And all objects are fully scalable, even allowing the user to zoom in without any loss of detail or quality. Try right-clicking on any of the animations you see on the FutureSplash-enabled pages, and you can play with the zooming feature.

#### **TRY IT OUT**

Animator comes with a few samples of Hypertext Markup Language pages you can paste into your own Web pages. They provide nice scripts so each page can determine what browser you're running and whether or not the required plug-in and/or ActiveX control is present and enabled.

Animator costs \$250, and you can download a 30-day evaluation copy from FutureWave's home page.

I was quite impressed with the product and will be making extensive use of it on my home page. You should, too. But take it easy — a little well-designed and classy animation can go a long way. A little too much and your home page will look like a comic strip.

Greenberg develops communications, security, antivirus and Internet software from the middle of the Catskills in New York on a farm called Virus Acres. He also hosts the Safe Computing Forum on The Microsoft Network. If your product is kewl, reach him at greenber@ramnet.com.

# INTERGRAPH

CONTINUED FROM PAGE 91

suffer bottlenecks in either the storage or network subsystems. The InterServe 660 demonstrates performance at the high end of that shown by the four-way Pentium processor machines. It provides approximately 125,000 transactions per hour, compared with the 86,000 to 94,000 transactions per hour found in the first generation of quad Pentium Pro systems — running at 166 MHz — tested thus far by Client/Server Labs.

#### **POWERFUL HARDWARE BUNDLE**

The machine sent for evaluation was configured to compete with serious midrange systems, such as RISC machines from Sun Microsystems, Inc., Hewlett-Packard Co. and IBM's RS/6000 division. Four 200-MHz Pentium Pro processors were at the heart of the configuration, supplied with 1G byte of main memory. One InterRAID Fast/ Wide SCSI II RAID system was integrated into the main system unit, supplemented by three additional InterRAID systems, each driving eight 4G-byte Seagate Technology, Inc. Barracuda drives, for a total of 128G bytes of disk storage. The InterServe system was housed in a

standard 19-in. rolling rack, which included a Samsung Electronics America, Inc. 15-in. monitor. Power requirements were met by a rack-mounted uninterruptible power supply, and electrical stability was enhanced by hot-swappable redundant power supplies on main CPU and RAID modules. One negative comment: Because of the rack's 7-ft. height, the monitor and keyboard proved awkward for a lab technician who is 5 feet 4 inches tall.

We evaluated the InterServe running Microsoft Corp.'s Windows NT 3.51 and SQL Server 6.5. Network connectivity was provided through an Intel 100Base-T network interface card.

#### **TWO-WAY TESTING**

The InterServe was evaluated using two loads: a traditional transaction processing load based on a modified subset of the TPC-C benchmark and a decisionsupport load based on a highly modified subset of the 10G-byte TPC-D benchmark. The server was driven by a network of 40 Dell Computer Corp. Pentium-based transaction-processing workstations and eight Dell Pentium-based decision-support workstations. All workstations were connected via 3Com Corp. SuperStack II Switch 1000 10Base-T switches, which then connected to a 3Com SuperStack II Switch 3000 TX for 100Base-T connectivity to the server. With this evaluation configuration, the InterServe processed online transaction processor transactions at a rate of 213,186 per hour and simultaneously served highly complex decision-support queries at a rate of nearly one per hour.

The most impressive aspect of the InterServe's performance was that the four CPUs showed utilization averaging more than 90%. In addition, they showed average utilization that didn't vary more than 5% among them.

The very high CPU utilization seen in the Intergraph system shows that the storage subsystem can move enough data to avoid being the chief performance constraint, a situation rarely seen in Intel-based systems. Network capability was also well-matched to the demands of this particular load, allowing data to flow to and from the server at a rate dictated by the server's ability to perform rather than the network's ability to transfer data.

Intergraph places the street price for an InterServe 660 with 256M bytes of memory and three 9G-byte disk drives at \$49,500. An additional 768M bytes of memory costs \$11,400, and five additional 9G-byte drives cost \$14,200. The system as tested, including a \$900 15-in. rack-mounted monitor kit, costs \$76,000.

Franklin is director of Client/Server Labs (www.cslinc.com) in Atlanta. Client/Server Labs is a test lab partner for Computerworld.

#### PRODUCT SUMMARY

The evaluations performed on the Intergraph machine show a system that makes full use of the processing ability of the 200-MHz Pentium Pro and of Windows NT's capability for scheduling tasks among multiple processors. System designers have been promising this type of performance since Windows NT's multiprocessor capability emerged. The InterServe 660 makes good on this promise.

Intergraph has a long history of providing solutions for engineering and architectural environments. With the availability of the InterServe 660, the company has a product that can provide high performance, high availability and

Windows/Intel openness to an increasingly demanding commer-



The InterServe 660 is clearly positioned to move into the traditional midrange system market and definitely has the performance to make the move.

# vou have Vision of the ultimate areer plan?"

For an individual, a careen is a journey.

For a team, careers are a series of simultaneous journeys.

New from

COMPUTERWORLD

accessing Release

#### **Search Thousands of Course List**

y Tree International

Ve Technologies

ewlett-Packard ational Services

niversity Corporate to Center

hnology Group

Business Communication

American Rese

HBM Tech

HOTT (Hands on Townson London And more communication)

there, check out the preview of upcoming CareerAgent release. They'll allow onals, individually or through corporate subscriptions, to assess learning styles, established career goals, calculate individual, group and department skill gaps with an intelligent decision support system, and focus a training search based on priority.

The point? Every individual on your team has an idea of their career plan, and knitting these plans together can benefit corporate goals. Think about your current team today. Do individual career plans in your organization seamlessly benefit from available projects? Training resources? Corporate goals? Is this information connected to cost-effectively reskill and retain staff? It's all possible with CareerAgent, where management and staff can collaborate to continuously develop a career "itinerary" for each individual. On the Internet or your intranet. Your choice.

For details, see careeragent.computerworld.com or call 1-800-343-6474, x7705 today. And make every career on your team what it should be: a well-planned journey of enrichment.



# In Depth

Is the

YEAR 2000

What you should be doing on your conversion. Managing, 83

Which IS professionals stand to gain from conversion projects and why? IT Careers

NO! By William A. Zeitz

Don't let the instant gurus feed on your insecurities. Don't let scare tactics keep you from confronting the issue rationally.

FALLING?

On Jan. 1, 2000, I'm going into the head-hunting business. Unless you respond to the challenge, you'll be in dire need of my services.

ouis J. Marcoccia

emonic Digits" ... "Tick, Tick, Tick" . . . "Will your systems be ready when the clock strikes 12?"

Those are some headlines from magazines and journals this year. The constant stream of doom-and-gloom, sky-isfalling hype perpetuated by the trade

> press and the nouveau gurus has done more to damage the information systems department's image than reporting to a chief financial officer did in the 1970s. We're in danger of eradicating whatever progress IS has made in the past two decades toward becoming a true business partner and contributor to the corporate bottom line.

The widely publicized and oftenquoted cost projections made by Gartner Group, Inc. more than a year

ago also fueled the panic and spawned a get-rich-quick industry.

Your business partners outside IS are relying on you to provide competitive and innovative technology-based solutions to key business objectives. At the same time, they expect you to protect their businesses from potential year 2000 damage.

During the past year, I've refocused my consulting business to address the year 2000 issue because many clients have been panicked by the hype. And I'm not alone. Consultancies such as Sicor LLC in Princeton, N.J., International

TechOrg, Inc. in Raleigh, N.C., and RCH Computer Consulting in Phoenixville, Pa., have also realigned their efforts.

These consultancies' goal, like mine, is to help companies address year 2000 problems without sacrificing competitiveness after the millennium arrives when all those year 2000 companies and gurus are no longer available.

To achieve that goal, we've developed a two-pronged approach. The first part focuses on identifying the right set of automated tools to facilitate the conversion and allow time for value-added efforts. The brute force approach won't suffice. The second part brings together key business and technical executives within a company for focused workshops

> designed to identify the gaps between the business drivers and the existing application portfolio.

Senior IS executives are searching for the right balance and are unwilling to throw in the towel and give up their hard-fought position.

For example, Christopher Linfoote, information technology director at a London divi-

sion of APV PLC, the international engineering company, knows he has a year 2000 problem with his application portfolio.

2000 problem. It may be the most significant change ever faced by the

es, Virginia, there is a year

information technology industry. It will have an enormous impact on business applications, package solutions and systems software.

It will put some companies out of business.

In April, I testified at a U.S. congressional hearing as an expert witness on the problem. I

> told hearing members that the only way we can delay the catastrophe is "to legislate the year 2000 away."

> This is the only deadline that can't be pushed back — and still information systems departments ignore it. We're already late - some businesses will suffer severe problems earlier than 01/01/2000.

Why are so many heads in so much sand? Most affected systems aren't state of the art, for one thing. IS sees no glory in repairing these clunkers. It's like keeping your old car on the road another winter rather than buying a new car; you know it's wiser, but it's no fun keeping the old heap roadworthy.

And, of course, there's no sexy return on investment for IS to point to with year 2000 issues. Nobody wants to tell the bean counters that the company must sink millions of dollars into a project just

for the honor of staying in business.

Nevertheless, IS has to

take a deep breath and do just that. Right now.

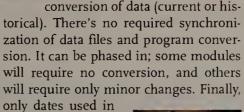
There are two primary ways to correct the year 2000 problem. The first is to expand all date fields to a four-character byte and leave the existing software logic alone. That's the cleanest, most straightforward solution. It's perma-

nent, it works for all modules, and future maintenance won't pose a problem.

But the date-field approach has drawbacks. It requires the conversion of all data files; conversion of programs and data files must happen at the same time; and some massive systems have to go down during the process — not an option with some applications in some organizations. Moreover, keeping the converted code in sync with updates to the current code is a boggling task in some cases.

The second approach is to leave the date fields as two characters but modify the software logic to handle the represen-

correctly. tation That's called the program logic approach. It has its own advantages. To begin with, there's no physical



There's also an initiative by software ven-

dor Baan Co. to replace all of APV's SAP

AG R/2 implementations. But wait —

there's more. Business and IS executives

are evaluating two major proj-

ects (one in the marketing

and sales arena, and one a

management system) intend-

ed to provide APV with major

Does this look like an IS or-

ganization that can drop ev-

erything to throw bodies at

the year 2000 problem? Of

course not. Linfoote's dilem-

ma is typical: He must balance priorities

and develop a plan that protects the busi-

ness from year 2000 failures while al-

lowing IS to provide the competitive ini-

In another example, John Schmidt,

year 2000 coordinator at Independence

Blue Cross in Philadelphia, wants to add

value to his company's conversion by us-

ing Lexington, Mass.-based Software

Emancipation Technology's Discover

Y2K product to re-engineer some of his

inherited C and C++ systems rather than

just making them year 2000-compliant.

at the same time? By not abandoning

the leadership qualities and management skills that made you successful

How do you walk and chew gum

tiatives expected from his organization.

competitive opportunities.

process-engineering

calculations must be changed.

What are disadvantages of the program logic approach? Many program modules will require extensive code changes for date fields used in calculations. In ad-

dition, in cases that involve a 100-year span, those applications will have to be expanded to an eight-digit date. That's typical with pension and life insurance applications, among others.

And, if an IS shop goes with this approach, the staff will have to be aware of the subroutines used to determine century by each application. Finally, each application in an organization can have a different number for its logic comparison.

Each method has serious benefits and pitfalls, which is why you needed a plan five years ago and really need one today.

The year 2000 problem affects nearly everything - any hardware that has a

in the first place.

Don't let the instant gurus feed on your insecurities. Don't let threats and scare tactics deter you from confronting

the issue with a sane and rational approach. Above all, don't be misled into thinking that your only option is to commit all your resources until the millennium to fix the problem.

So, what's an IS executive to do? Don't panic. Statistics can be misleading, even when blessed by our industry press and gurus. Everyone knows

that headlines sell newspapers. Remember, not all date fields are created equal, nor are all date fields affected. Get an independent assessment of the exposure your company has.

Inform your senior management of the exposure the business faces. Provide a balanced action plan with full costs and value-added benefits.

There's no need to panic today, but don't procrastinate. The longer you wait, the higher the risk and the more urgent the need to secure your airplane tickets to leave the country by December 1999.

Zeitz, formerly chief information officer at American Cyanamid's Agricultural Division, is president of Zeitz & Associates, a consulting firm in New York. His Internet address is zeitzw@aol. com.

chip that calculates dates, PCs, packaged software. Organizations need to review all aspects of their business to establish their year 2000 exposure. All systems that won't be replaced or retired by 2000 must be reviewed. Applications that will exist past 2000 must be corrected.

Within most organizations, there are client-developed systems that IS doesn't support. Those systems were developed or purchased by the business units. It's important to make a list of software lurking in the shadowy areas. IS must then decide whether to retire, replace or modify each system.

I have a message for IS executives who are attending sexy Inter-

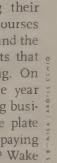
net classes, for chief executives who look at only current quarterly profits, for IS professionals who are spending their training budgets on client/server courses and for IS managers who understand the problem and know in their hearts that they aren't doing the right thing. On Jan. 1, 2000, I'm going into the year 2000, catastrophe-fix head-hunting business. If you fail to step up to the plate right now, guess who'll be paying through the nose for my services? Wake up and smell the year 2000.

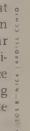
For several years, Marcoccia was the year 2000 project manager at the New York Transit Authority. He is now a year 2000 consultant. His Internet address is lmarcoccia@aol.com.













What you should do now to prepare for your year 2000 conversion. Managing, page 83

Sound off: Is it time to panic, or isn't it?
In Depth, page 96

# IT Careers

# 

into corporate superstars

#### By David Weldon

Ross Carter hopes to add 10 Cobol programmers to the information systems staff at Allmerica Insurance Co. in the next few months. But if those programmers are anything like the last 10 hires, they won't come easily or cheaply.

Worcester, Mass.-based Allmerica is nine months into a year 2000 conversion effort. Some of the work is being outsourced to 17 contractors working on-site. But much of it will be handled by in-house staff, says Carter, who is vice president of application services.

Carter struggled this year to add 10 programmers. Those hires identify, rewrite and test date-sensitive code from the company's inventory of 13 million lines of code. The bulk of their work isn't technically difficult, but Carter says the older nature of the skill, combined with an extremely tight job market, made it costly and "very difficult to find them."

COBOL COMEBACK

An old skill will earn new respect and higher salaries as the backbone behind year 2000 conversion projects.

"Five years ago, Cobol programmers were very marketable and had no trouble finding jobs," says William Grady, director of information technology search at Romac International in Boston. Then came client/server technology. And in terms of new hires, "Cobolers faded off, almost to the point of extinction," he says

But now they're back — and with a vengeance, Grady says. As the computer

industry races to deal with year 2000 conversions, Cobol programmers are among the most sought-after IS professionals. Indeed, Cobol ranked as the fourth most in-demand language skill for the coming year in the recent *Computerworld* Annual Skills Survey. "Suddenly, the demand is up by a lot, but the supply isn't," Grady says.

Carter knows that bittersweet reality. When recruiting the 10 programmers for Allmerica this summer, he was often forced to hire programmers who had limited experience. Or he brought in "retirees" — former Cobol programmers who had been laid off in downsizing efforts.



For the next round of hiring, Carter's options will worsen.

Many companies that have been in the assessment phase of year 2000 conversions during 1996 will begin actual code conversion next year. That will require large-scale staffing, sending companies and outsourcers scrambling for any available talent. Cobol has been considered a dead skill, so IS professionals haven't been lured to it, and there aren't a lot of fresh faces.

The supply-and-demand gap will drive up salaries "20% to 25% more than [employees] normally can get," Carter predicts, based on the current salaries he pays. The huge demand also will force

companies to hire more retirees, those changing careers, recent college graduates and outsourced talent. It will also persuade "people who have skills beyond Cobol to look at the opportunity to get rich quick and to go back and use their old skills," Carter says.

Companies that will have the easiest time will be those converting their systems as well as their code, Grady says. Those companies will have both higher salaries and new skills to offer.

The Cobol gap may also encourage corporate raiding, says Janis Russell Love, president of People Unlimited, an IS consultancy and recruiting firm in Charlotte, N.C.

"We haven't seen a lot of call for Cobol programmers and mainframers in the past five years, and these people have really been put on the back burner, getting pretty low pay," Love says. Suddenly they're in demand and not very loyal.

#### **PROJECT MAKES PERFECT**

Top project management skills can provide IS professionals with vital leadership roles and a quick rise to stardom.

Armstrong World Industries, Inc. in Lancaster, Pa., is about to start serious staffing for its year 2000 project. Robyn Alspach, general manager of business information services, says she expects to "rent some Cobol programmers." But her first step was to appoint a project manager from within.

"We started with an internal person to do the assessment. We had someone who was available, had good organizational skills, had system knowledge and was good with communication," Alspach

As the brains behind the conversions, a project manager such as this could earn \$100,000 by the end of next year, according to Grady.

They can also look forward to a rare opportunity to gain new skills, learn the business, gain visibility and shine in the eyes of top management.

"Project managers who do well will become critical to their organizations. They will know all the interrelationships of the systems and be better able to compete," says Gary Ross, director of the year 2000 practice at Comtex Information Systems, Inc. in New York.

#### **CONTRACT KILLINGS**

In an already-strapped job market, conversion projects will boost the role of contract IS professionals.

Although Carter struggled to find 10 Cobol programmers this year, he notes that his "outsourcer seems to be able to find what they need."

Outsourcers have been doing hurried hiring this year for their clients' year 2000 work. In the race to build up staffs, outsourcers are blanketing the local IS job markets, tempting relocators, raiding competitors, forming alliances and scouting campuses.

Those most in demand include the two extremes in conversion work: top-rate project managers and "grunt work" programmers.

By offering bigger salaries to experienced project managers and programmers, outsourcing companies can potentially "lure a lot of talent. They can then put them back to work in the same shops," says Leland Freeman, a year 2000 consultant at Management Support Technologies in Framingham, Mass.

Carter says he expects the ranks of IS contractors to explode with people entering the industry who couldn't have otherwise. Outsourcers are scooping up programmers wherever they can find them, and they are creating them where they can't.

For example, Bridget Gray and Andrew

Crouter are among several recent college recruits at Complete Business Solutions, Inc. (CBSI) in Farmington Hills, Mich. CBSI is tapping local college co-operative education programs for students skilled in computer science and mathematics. They will begin intensive Cobol training this month, followed by immediate placement at a client site.

Crouter, from Flint, Mich., is a math major with a minor in computer science. He considers his first programming assignment an opportunity to "check out the industry" and see if it is a career fit. Gray, an IS management major from Lincoln Park, Mich., is convinced IS is her career destiny.

She hopes year 2000 work will give her a head start.

#### **CONSULTANTS CASH IN**

Year 2000 promises to be a very good year for consultants.

Ideally, year 2000 project managers "come from within the organization," says Brad Myers, director of the year 2000 practice at Actoras Consulting, Inc. in Indianapolis. The reality is "there aren't enough people with the skills needed for these projects," he says.

"Clients need a good, strong project manager who has been around a large conversion or maintenance project and has good technical analytical skills," Ross says.

So consultancies are luring talented project managers with promises of big

salaries, stay-on incentives and project-completion bonuses.

For IS contractors with stellar skills, these stay-on bonuses can run as high as \$150,000, Freeman says. And that's on top of an annual salary that can be equally as high.

Some companies will be paying these big bonuses, too, Love says. "But many can't. They can't compete with the consulting firms," she says. As a result, many people will jump ship and go with consultancies, Love predicts.

Why such huge salaries?

Myers says the project managers leading these efforts must be near-perfect. They must understand the firm's entire system enterprise, the business, the technical challenges and the skill needs of project staff.

Grady says he expects to see many IS professionals with technical skills and project management experience try to launch independent consulting careers around year 2000 work. But he advises that, like any hot IS skills set, they may have a limited shelf life.

"Independent contractors are rentable for the specific experience thay have and that alone," Grady says. "It will slam shut at a certain point. They will be paid a lot of money for a short amount of time. But then they must find a way to re-engineer themselves."

Weldon is Computerworld's senior editor, IT Careers.

#### SALARY EXPECTATIONS

IS hiring managers and recruiters expect to see the following salaries for year 2000 projects:

SKILL OR JOB FUNCTION	Year 2000 conversion consultants	Project managers	Cobol programmers
SALARY EXPECTATION (LOW ESTIMATE)	\$100;000	\$89,600	\$60,000
SALARY EXPECTATION (HIGH ESTIMATE)	\$150,000	\$100,000	\$86,000

# Year 2000 career RESOURCES

# CONFERENCES AND SEMINARS

PROJECT WORLD

Dec. 9-13

Santa Clara, Calif.
(617) 431-9797

E-mail: admin@projectworld.com

SPG YEAR 2000 CONFERENCE Feb. 9-11, 1997 Washington (508) 366-3344

DCI'S YEAR 2000 ISSUES AND ANSWERS CONFERENCE

March 25-27, 1997 Phoenix (508) 470-3880 www.dci.expo.com/2000AD

#### **ONLINE RESOURCES**

THE YEAR 2000
INFORMATION CENTER
www.year2000.
com/cgi-bin/y2k/year.2000.cgi

COBOL HOME PAGE www.cba.uc.edu/-HUBER/ COURSES/COBOL/ CALENDAR.HTML IBM COBOL NEWSLETTER www.software.ibm.com/ad/cobol/cobnews.htm

#### JOB LISTINGS

#### **IT CAREERS**

www.careers.computerworld.com *Computerworld*'s online career resource site, with job postings and training resources.

#### CAREER MART

www.careermart.com/ Allows for job searches by state/ region, job categories and, optionally, by company name.

#### JOBWEB

www.jobweb.com/ An ideal site to search specifically for IS jobs that require only one to three years' experience or those aimed at college graduates.





#### Tick, Tick, Tick

Year 2000

**Conversion Consultants** 

KPMG, The Global Leader in professional services firms knows that the arrival of the millennium will impact every technologically advanced business in the world, and they're determined to stop millennium madness before it begins. There has never been a time in information technology history when we have had to draw upon the collective skills of so many different resources.

KPMG is wasting no time hiring the finest

professionals to work as part of a cohesive team, map-

ping strategies to take our clients safely into the next century. HOW? By leveraging their investments, whether their course of action is to retire, replace or renovate their current legacy systems. And, by giving in-depth, customized assessments that address more

We're giving immediate consideration to professionals who have 3+ years of experience in the following areas:

than simply expanding the two-digit field.

■ Project Management of large complex system conversions and implementations.

■ Significant conversion experience with languages, operating systems, databases and application re-hosting.

■ Management of mainframe programming, version control and testing.

We helped our clients transition to the year 1900, and we look forward to helping our clients face the challenges of the year 2000.

To find out how your future can be positively

impacted, contact us in any of the following ways (please indi-

cate Dept. SACW61209 in all responses): FAX (high resolution) your resume detailing your qualifications to (201) 505-6200. MAIL a scannable copy of your resume to KPMG Resumix Office, 3 Chestnut Ridge Road, Montvale, New Jersey 07645. E-MAIL (ASCII text) to resume@pa0015d5.us.kpmg.com.

We are an equal opportunity employer.

KPMG Peat Marwick LLP is the U.S. member firm of KPMG International.



For more information, visit our website at www.us.kpmg.com



THE GLOBAL LEADERSM

## YEAR 2000 SOLUTIONS **DEVELOPMENT**



We are a world leader in information technology consulting, software development and education services. By providing leadership in designing, implementing and transitioning to advanced, large-scale, distributed solutions, we have grown 100% in the last year. The coming millennium has brought

about some exciting software development opportunities. As a result, we're expanding our Year 2000 practice nationally and seek

#### PROJECT MANAGERS & SR. SOFTWARE DEVELOPERS

Our positions require IT project experience in vendor package implementation or business applications development - Technology consulting is a strong plus. Specifically, candidates should have a solid programming background (e.g., COBOL, BAL) in a large mainframe (e.g., MVS) environment, preferably with on-line (e.g., CICS) and/or database (e.g., DB2) expertise. Experience in project management is highly desirable, and Year 2000 software tools (e.g., AdPac, Viasoft) are a plus. Both opportunities involve travel.

PLATINCIA Solutions, Inc. offers excellent salaries, benefits, flexible hours and a casual atmosphere. For additional information please contact: PLATINUM Solutions, Inc., Attn: Vince Melillo, 9800 La Cienega Blvd., Inglewood, CA 90301. Tel: (800) 522-2491, ext. 4704. Fax: (310) 537-5292 E-mail: vincem@platsol.com - See us on the World Wide Web: http://www.platsol.com. Equal Opportunity Employer.



#### ATTENTION I.S. Professionals!

Add your resume information to the Discovery Database and let all the consulting companies that are looking for your skillsets come to you. Assignments and/or positions are available nationwide for absolutely all skillsets. And it costs you absolutely nothing! If you want the added advantage, mail or fax your resume to:

#### Lhe Discovery System

P.O. Box 37075 Kansas City, Mo. 64138

FAX (800) 505-6293 Voice (800) 222-0751

Assignments: Contract W2 ◆ Contract 1099 ◆ Contract for Hire . Permanent Placement

Positions: Applications Programmer ◆ Database Administrator ◆ Network Administrator ◆

Programmer/Analyst ◆ Systems Analyst ◆ Systems Administrator ◆ Team/Project Leader ◆ Technical Writer

coordinato

Information

#### INFORMATION SYSTEMS COORDINATOR

The Village of Woodridge, DuPage, Will and Cook Counties, Illinois (population estimated at 29,000). is seeking an Information Systems Coordinator.

The Ideal candidate will have Local Area Networks experience. Knowledge of the Novell 4.0 operating system is required; a CNE designation would be a plus. Must be a self-motivated individual. He or she will be a systems professional with strong interpersonal and managerial skills and one who keeps abreast with the state-of-the-art technologies. Ethernet, SNA technology and Microsoft Office are necessary. The successful individual will have a strong background in planning certbeddeep for carea integration. methodology for system integration.

The salary range is from \$43,368 to \$59,072. The Village offers an excellent benefit package and working conditions. Submit resumes, salary requirements and three (3) work-related references to Kathleen F. Rush, Village of Woodridge, 1900 West 75th Street, Woodridge, 11 60517, but Feider 12 1996 by Friday, December 13, 1996.

Applicants with disabilities who will need accommodations in order to complete any portion(s) of the pre-employment application process should contact the Administration Department. Equal Opportunity Employer



he City of Charlotte, NC is seeking an individual to direct the The City of Charlotte, The laddening and related information systems and related information systems and related information of the city o tion technology services for a broad and complex range of municipal service providers; provides leadership in formulating an information technology vision and implementation plan for the entire City organization. Responsible for consulting with departments as systems and computer applications are developed; determines the City's technological infrastructure needs and assists the organization with enhancing business and communications processes through greater use of information and technology; leads a staff of approximately 60 employees with an annual budget of \$6 million. Requires four year degree in business/public administration, computer science, management information systems or related with masters degree desirable; seven to ten years responsible, managerial experience in a related environment. Excellent communication skills are critical and a managerial style that motivates employees and empowers users is

Mail resume and salary history to City of Charlotte, Human Resources, 600 East Fourth Street, Charlotte, NC 28202, OR FAX to: (704) 336-6588, by JANUARY 10, 1997.



SEI provides application packages to clients throughout the United States & Internationally. We currently have opportunities for:

ORACLE FINANCIALS, DEVELOPERS, DBA'S & ALL OTHER MODULES. S. CALIFORNIA & EAST COAST

SAPAIR IMPLEMENTATION. EAST COAST

SAP/HR PERMANENT POSITIONS; MUST HAVE HEAVY FI & HR IMPLEMENTATION EXPERIENCE. NORTHWEST

 100'S OF PERMANENT SAP/BAAN POSITIONS MEXICO, CENTRAL AMERICA, SOUTH AMERICA Must be bilingual in Spanish

BAAN PERMANENT/CONTRACT. WORLDWIDE

SAP ALL MODULES PERMANENT, PACIFIC RIM

PEOPLESOFT PERMANENT. AUSTRALIA ATM TECHNOLOGY

Fax or e-mail your resume in confidence to Greg Taylor: enhance@mail.microxl.com (800) 576-0112 FAX (800) 576-3858

Senior Programmer Analyst. Develop, test & implement software for management informa-tion systems. UNIX administration & technical support. Tools: UNIX, SHELL, FMLI, MAKE, COBOL, TOPEND, ISAM-XA. 40 hrs/wk, 8am - 5pm. \$55,000/yr. B.S. in Computer Science or, 4 yrs exp as programmer/analyst acceptable in lieu of B.S., plus 2 yrs in job offered or as a Technical Consultant required. Previous experience must include: UNIX, COBOL, ISAM-XA & TOP-END. Submit resul mes to the following address: Job Service of Florida, 2312 Gulf-to-Bay Blvd, P.O. Box C, Clearwater, FL 34618-4090, RE-Job order number FL-1525829.



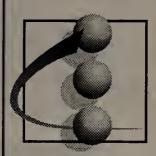


/careers.computerworld.co

Systems Analyst Duties: Administers multi-tasking system in Novell, UNIX and A\$/400 LANWAN environment. Provide technical support, system optimization and software training to 2004, and users [Install] hardtechnical support, system optimization and software training to 200+ end users. Install hardware, configure and modify PC workstations, laptop docking stations and HP pinting devices. Install and support software applications and utilifites, Support network system setup and upgrades including PC workstation setup, TCP/IP installation, Lotus Notes installation, CfSCO router setup and file server building. Support nationwide remote network access configuration and cross network data sharing. Perform daily system maintenance using Arcserver. Requires: B.S. in Mechanical or Electrical Eng. or Comp. or Info. Science and 1 yr. 3 mo. exp. in job offered or as Systems Engineer or Programmer-Analyst. Concurrent experience must include 1 yr. exp. with Network Systems Management, PC hardware configuration, software installation, and user support, 6 mo. exp. in TCP/IP installation; and 6 mo. exp. in TCP/IP installation; and 6 mo. exp. in CISCO router setup and file server building. EOE. 40 hrs/wk; 8:30 AM to 5:30 MM. Salary: \$40,000/yr. Send resume or apply in person to Georgia Department of Labor Field Service Office.

Programmer/analyst (Consultant). Design & dev. automated business systems according to clients, functional reqs using RDBMS, CASE method., 4GL app. dev. tools, & C/C++ prgrmmng. Analyze business systems, build togical & physical data models, design database, & provide project leadership to dev. & implement custom applications. Perform DBA & tune d/o & applications code. Provide project feadership & mentor less senior consultants. Train users & support apps. Must have BSCS/EE or equiv. (such as a degree in another technical field that includes ext. CS study) & 5 yrs. exp. in job offered or 5 yr. rel exp in dev. RDBMS business systems in C/Unix envirmmnt. Freq. travel to client sites thruout the Southeast U.S. \$4000/mo.; 40 hr./wk. Job/interview: Atlanta. Apply in person or submit 2 resumes to Georgia Dept. of Labor, Job Order # GA 604574, 2943 N. Druid Hills Rd., Atlanta, GA 30329-3909 or the nearest Dept. of Labor Field Service Office. Must have proof of legal authority to work in the U.S. legal authority to work in the U.S.

# WHEN COMPANIES LOOK AHEAD, THEY SEE Us.



CSC is a world leader in the science of information technology and its application to achieve clients' business objectives. Serving both industry and government, we offer a broad range of professional services in management consulting; business reengineering; and information systems consulting, integration, and outsourcing.

Every business wants to be more competitive. And when part of the solution involves using the most advanced information technology on the market, they come to CSC. That's because we've been helping our clients get the edge on their competition for years. CSC is one of the global leaders in management consulting, systems integration, and outsourcing. We are committed to taking the companies we work for to a higher level, where they can compete more efficiently. Currently, we have a number of openings for forward-thinking technical professionals with a willingness to travel.

#### **Technical Architects**

You will advance our success in client/server and open architecture environments as you interface with client management and technical personnel. The Technical Architect must be able to bridge the gap between the client and our application designers, database specialists and other technical experts to ensure that our solutions support business requirements. We'll rely on you to drive the component selection process, provide technical leadership throughout implementation, and write the "technical approach" section of project proposals. To qualify, you must possess at least ten years of experience in the design and development of systems architecture for business application. You should also have in-depth knowledge of client/server systems, UNIX, LANs, WANs and relational database products including Oracle, Sybase and Informix.

#### **Project Managers**

You will direct large system development and integration projects from inception to delivery. You must have demonstrated experience that encompasses large project management, sales, and the delivery of large projects on time and within budget.

#### Applications Developers

You will work with a variety of clients to transform business requirements into productive systems using rapid application development methodologies. We require substantial related experience that includes full life cycle development with C, UNIX, SQL-based RDBMSs (Oracle, Sybase, Informix). Working experience with PowerBuilder, C++, or Windows NT programming is preferred.

In return for your contributions to our continued industry leadership, we offer an excellent compensation package and a commitment to provide opportunities for your ongoing professional development. Electronic resumes in ASCII format only, are preferred and may be sent to: csi4@csc.com. No file attachments, please.

**CSC Consulting & Systems Integration,** Attn: Recruiting, 300 Executive Drive, Suite 300, West Orange, NJ 07052. Fax (201) 243-7540

For more information on CSC, visit our website: http://www.csc.com. An Equal Opportunity Employer M/F/D/V.

# **Deloitte & Touche Consulting** Group **DRT Systems**

#### INFORMATION TECHNOLOGY IN A **NEW LIGHT**

DRT Systems International is looking for a select group of IT consultants for our Year 2000 practice. This practice provides unique opportunities for professionals with creativity, high energy, and strong interpersonal/presentation skills.

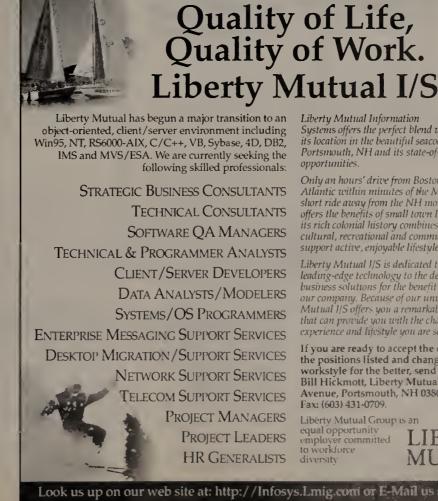
#### **YEAR 2000 PRACTICE**

- Strong Project Management skills for long duration projects
- Technicians with knowledge of the following a plus:
- PM/SS-Systems Vision 2000 Microfocus Revolve
- COBOL REXX SAS

Excellent oral and written communication skills required. This practice offers exciting opportunities for significant professional growth and challenges in any one of our thirteen branches nationwide. DRT offers a competitive salary and attractive benefits packages.

DRT SYSTEMS INTERNATIONAL, L.P. 1633 Broadway, 4th Floor New York, NY 10019 (212) 492-3600 Fax: (212) 492-3666 E-mail: Imusella@dttus.com

**Equal Opportunity Employer** 



Liberty Mutual Information Systems offers the perfect blend with its location in the beautiful seacoast town of Portsmouth, NH and it's state-of-the-art technical Only an hours' drive from Boston, located on the Atlantic within minutes of the Maine border and a short ride away from the NH mountains, Portsmouth offers the benefits of small town living where the aura of its rich colonial history combines with contemporary cultural, recreational and community events that support active, enjoyable lifestyles Liberty Mutual 1/S is dedicated to effectively applying leading-edge technology to the development of the best business solutions for the benefit of our customers and our company. Because of our unique situation, Liberty Mutual I/S offers you a remarkable opportunity, one that can provide you with the challenges, growth, experience and lifestyle you are seeking If you are ready to accept the challenge of one of the positions listed and change your lifestyle/ workstyle for the better, send your resume to: Bill Hickmott, Liberty Mutual US, 225 Borthwick Avenue, Portsmouth, NH 03801.

Fax: (603) 431-0709. Liberty Mutual Group is an equal opportunity employer committed to workforce LIBERTY

Look us up on our web site at: http://Infosys.Lmig.com or E-Mail us at: Jobs@Lmig.com

œ

#### 5 WAYS TO EXCEL IN NEW YORK LIFE.

New York Life, one of the leading financial services companies, currently has opportunities in our New York City Home Office. We are seeking talented individuals with good analytical and communication skills with two or more years experience for

#### INTERNET & NETWORK SECURITY SYSTEMS SPECIALIST

Detailed knowledge of various Internet, Intranet Service Languages and Protocols (HTTP, SMTP, SSL, HTML, CGl, etc.) is required.

#### NETWORK SOFTWARE & SOLUTIONS SYSTEMS SPECIALIST

Disciplines such as: LAN/WAN Connectivity (Gateways, Bridges, Routers, Token Ring, Ethernet, Multiplexers, etc.) Software: (VTAM, NCP, XCOM, Netware, etc.) Protocols: (TCP/IP, SNA, IPX, Netbios, LU6.2, FTP, etc.)

#### METHODOLOGY SPECIALIST

Experience in developing and supporting C/S and object-oriented methodologies and related tools, modeling and full life cycle support is required. Familiarity with testing strategies, reuse/repository concepts is preferred. Excellent writing and interpersonal skills are essential.

#### **HUMAN FACTORS SPECIALIST**

Working in a team-driven environment, responsibilities include: task analysis and applying your understanding of customer/business requirements; workflow analysis; screen design and prototyping; user interface evaluation; usability testing; documentation and recommendations; and the design and promotion of a common corporate graphical user interface. You must have two years' experience in GUI design and/or usability testing and a degree in Applied, Experimental or Cognitive Psychology or Human Factoring Engineering.

#### MIDDLEWARE SUPPORT

Support middleware operational environment, including APX middleware product. Assist in the support of a CICS environment. Proficiency in APX, JCL, TSO, COBOL and/or ASSEMBLER, CICS is required.

We provide competitive salaries, a flexible benefits package, training for personal and professional development, tuition assistance and many other attractive benefits. If you would like to work in a challenging environment, send your resume, including salary requirements, indicating position of interest to: Mike McGrath, Employment Department-Room 151, New York Life Insurance Company, 51 Madison Avenue, New York, NY 10010. We are proud to be an Equal Opportunity Employer M/F/D/V.



The Company You Keep.®

#### THE COLLEGE OF THE HOLY CROSS

#### INFORMATION TECHNOLOGY SERVICES POSITIONS

The College of the Holy Cross is a highly selective Jesuit liberal arts college situated in Worcester, MA. The College is approaching the challenges of IT with two related endeavors. First, we are investing \$5.5 million in a capital improvement program. Second, we are creating an environment where the benefits of the new technologies will help to fulfill, even more effectively, the mission of the

Currently, the infrastructure includes a Novell network with 3500 users, over 20 production servers, and approximately 1300 desktop computers. Future development objectives include network-based services, applications development and WWW: The ITS department is looking for team players with proven technical abilities. Opportunities are available for ambitious, achievement oriented professionals in the following areas:

#### Software Developers (Multiple Openings)

Experience in SDLC, Client/Server development, C, C++, Powerbuilder, design and testing tools, WWW, UNIX, NetWare, NT, Relational Database and Project Management. Image technology a plus.

#### Technical Services Engineer - UNIX/NetWare

Experience in TCP/IP, UNIX/NetWare Administration (5olaris 2.5, ULTRIX 4.3, AIX, NetWare 4.1) NF5, NI5, NI5+, TEX, Relational Database implementation and configuration, WWW, and Internet

#### Data Base Administrator

Experience with Oracle, Sybase, 5QL Server performance tuning, security, reporting, and standards; data modeling, Operational Data Store/Data Mart, Data Warehouse development and implementation, UNIX, NT, and NetWare.

#### Senior Programmer Analyst (Multiple Openings)

Responsible for maintaining & upgrading 5tudent Information 5ystems and Financial applications. Qualifications should include open VM5, COBOL, RMS. FOCU5 and a strong commitment to customer service.

#### **Production Services Manager**

Responsible for the daily operation of the College's Notwork Operation Center, Network, Servers and production processing, This would include supervising a

For further details regarding individual positions visit our web page at www.holycross.edu. Plcase send cover letter, resume and the names and telephone numbers of 3 references to: Employment Coordinator, Personnel Department, College of the Holy Cross, PO Box Per, One College Street, Worcester, MA 01610-2395.

Holy Cross is an Affirmative Action/Equal Opportunity Employer

#### YEAR 2000 Project

MI5-Resources International, Inc. An Information Technology consulting firm with a business focus concentrated in the southeast has multiple openings for Programmers on year 2000 projects. Any IBM (IDMS, IM5, MV5) or DEC (VM5, Open VM5) application

Please call for more details or FAX resumes to Mr. Kennedy Ph. (770) 594-7500 FAX (770) 587-1932

GKennedy@MIS-Resources.com

We are staffing teams for long term projects in one of America's most fivable cities: Pittsburgh, PA

#### TANDEM P/A's

legacy systems and help in client-server migration

#### PeopleSoft (

Implementation specialists, developers to DBA's needed,

We offer top rates, competitive benefits, and a great quality-of-life location.

fax: 412-939-0603

#### int÷rim.

#### **New Jersey Opportunities**

Solutions Group is a recognized industry leader providing Information Systems Staffing to Fortune 1000 companies nationwide. We currently have opportunities in the following professionals: New Jersey for the following professionals:

http://www.Interim.com

- Lotus Notes Developers
   LAN/WAN Admin/Techs
   Systems/Application Progrs
   PC HW/SW Techs
   Help Desk Analysts
   CNE's/CNA's

1 Meadowlands Plaza, Suite 200 East Rutherford, New Jersey 07073 Attn: CW 12-2

Phone: (201) 935-1300 Fax: (201) 935-7276 E-Mail: 104436.2334@Compuserve.com

Merging Technology With People.

As technology grows increasingly complex, we at Tiffony Computer Systems, Inc. are meeting the challenge through a ronge of services. Take this appartunity to join us if you possess skill in any of the

•Mainframe •Client/Server ·Networking

•Groupware

Please forward your resume to: Tiffany Computer Systems, Inc., Dept. CR, 150 Fairfield Rd., Foirfield, NJ 07004-2482 Phone: (201) 882-1037. Fox: (201) 882-8558. E-moil: jill@tiffonycomp.com.

Tiffany Computer Systems & www.tiffonycomp.com.

EOE-M/F/D/V

User Support Analyst Must have BS in Computer Science, Engineering or Math. Will provide full customer support for SAP system. Must have at least three (3) years experience in all levels of SAP system, functional, theoretical, practical & technical expertise required. Must be proficient in following SAP system basics: Screenpainter, ABAP/4, Data Dictionary, R/2 and R/3 Versions. Will confer with users regarding needs and ascertain system requirements, develop conceptual design for various SAP modules, including objective, organizational structure and description of processes, customize SAP system to fit customer applications, create business prototypes, monitor operation of SAP systems and coordinate corrective actions, cooperation with and provide technical support to system users, will rely on several SAP specific tools, cross-reference between tables, dynpros, domains & fields applicable to all SAP modules, master file management tools, project report writing tools, tool for development manment tools, project report writing tools, tool for development management and system optimization. agement and system optimization, application library. Will provide project status reports to user management, and develop accurate documentation that complies with company standards. Must have proof of legal authority to work in the U.S. Salary \$95,000/year. 40hpw. Several positions available. Apply in person or send two resumes to: Georgia Department of Labor, Job Order #GA6047224, 2943 North Druid Hills Road, Atlanta, GA 30329-3909 or the nearest Department of Labor Field Service Office.

SOFTWARE ENGINEER to design, develop, implement, test and document GUI-based software for health care information systems under MS Windows systems using Visual C++, Windows SDK and ODBC; Design maintain and trouble-shoot Oracle and Sybase relational databases for applications inhouse and at client sites; Port existing applications to MS Windows platforms from UNIX (HP-UX) platforms; Write SQL reports for adhoc queries per client requests; Provide queries per client requests; Provide customer training and support on developed systems. Require: B.S. degree in Computer Science with four years of experience in the job offered or in the related occurration. offered or in the related occupation of Programmer/Analyst, M.S.C.S. degree with two years of experience may be substituted for B.S. C.S and four years of experience. Full-time or part-time equivalent experience gained before or after earning the degree will be accept-ed. Salary: \$53,000/year; M-F. 8:30 a.m. to 5:30 p.m. Apply with resume to: Georgia Department of Labor, Job Order # GA 6048192, 465 Big Shanty Road, Marietta, GA 30066-3303 or the nearest Depart-ment of Labor Field Service Office.

Position: Database Administrator. Salary: \$45/hr. 40 hrs. per week (8:00 A.M. - 5:00 P.M., M-F). Education: Bachelor of Science in Computer Science. Two years' prior experience in Oracle Database Administration in UNIX environment, include one year's experience with Oracle Applications package. Duties: Using the Oracle Database and Oracle Database Applications packages on a UNIX operating system, install and upgrade the manufacturing, financial and other required databases for a computer manufacturing plant. Monitor and tune databases. Configure and tune UNIX kernel. Design and implement database and application security. Guide developers in writing and debugging efficient code. Design and implement software tracking & management tools and backup procedures. Job is located in Columbia, South Carolina. Send Two (2) Resumes to: Ms. Cathy S. Phillips, E&T Technical Services, SCESC-SC2000633, Post Office Box 1406, Columbia, South Carolina 29202.

Programmer Analyst (Atlanta, GA) - Analyze, design, develop & implement software for banking applications. Design & develop databases using Oracle 7; provide user interface using GUI tools (CASE, SOL'FORMS, Oracle Reports, Data Ouery, Business Objects, etc.); tune database & applications; provide backend support using Oracle tools (SOL'PLUS, SOL'LOADER, PRO 'C, PL'SOL); implement applications using client/server technology on various platforms (DOS, UNIX, SOLARIS, PC/AT on Network LAN); develop documentation & train users. BS in Comp. Sci. or Math -2 yrs exp in job offered. \$60k/yr., 40 hrs/wk, 8:30AM-5:00PM, M-F. Send resume in dupl. to Georgia Department of Labor, Job Order #GA6048168, 2943 N. Druid Hills Road, Atlanta, GA 30329-3909 or nearest Dept. of Labor Field Service Office. Must have legal authority to work in US. No fee charged.

Sftwr Developers. Design, develop, implem't & test client-server (CS) applic'ns w/ PowerBuilder (PB) & Object Oriented Program's Methods'ny Provide PB (PB) & Object Oriented Program's Methodo'gy, Provide PB train'g, monitor'g & co-develop't for clients; Design, develop, maintain & test GUIs w/i CS architecture and PB Class Library; Work alone at client site/lead a team of developers in-house to design database models, optimize databased managem't & train users w/ CS & PB program'g, MS in Computer Sci., 5 month exper'ce in any position working w/ PB 4.0, PowerTool, & License as a Certified PowerBuilder Developer req'ed. \$45,700/yr, 40h/w, 8-5, Resume to Job SVC of FL, PO Box "C", Clrwtr, FL 34618. Job#FL-1528168. SOFTWARE ENGINEER. \$46,000 per year. Responsible for the design, implementation, and testing of software for the Skytel 2-way system. The software will be developed in C++ and UNIX for Dec Alpha Computer Systems. Developing and designing telecommunications software for system and client applications. Requires a Master's Degree in Computer Science, plus two years experience as software engineer or systems analyst. Requires 12 months experience in UNIX, C/C++ languages. Respond to: Mississippi Employment Security Commission, P.O. Box 20609, 2350 Hwy 80 W. Jackson, MS 39289-1609. Job Order #MS 2777053. SOFTWARE ENGINEER.





Computer

# In The World Of Retail, Information Is Everything.

At Crown Books, we know that technology is critical to our continued success So are the professionals behind the technology. People just like you. We have extremely ambitious plans for the future. In fact, we are currently re-engineering the systems that will support every aspect of our business. Are we speaking your language?

#### Manager, Store Systems Support

Based out of our Corporate Office in Landover, MD (conveniently located 20 minutes from Washington, DC and Annapolis), successful candidate will use his/her technical expertise to effectively plan and manage all functions related to store systems support. In addition to overseeing a national team of Store Systems support personnel, individual will also manage new store installations; equipment purchases and inventory; and hardware service and support maintenance

Requires 5 plus years experience managing a system support organization in a retail chain environment. Knowledge of or experience in PC's, LAN's/WAN's, Microsoft NT, Windows, Concurrent DOS and retail applications preferred, BS/BA degree in Computer Science is highly

All the information points in one direction: to a rewarding career opportunity at Crown Books. Please mail or fax your resume to: Crown Books, Attn: HR-MSS-12/9-CW, 3300 75th Avenue, Landover, MD 20785, FAX: (301) 731-1838, or call our Job Hotline: 1-800-JOB-CROWN. EOE, M/F/D/V.

#### CROWN 站 BOOKS

#### For Peritus, Year 2000 is just the beginning...

Penlus Software Services, Inc. is a rapidly growing privately held company with the #1 automated Year 2000 conversion technology licensed by most of the major service providers. Our international base and impressive customer list are evidence that Penlus is a key player in the Year 2000 marketplace. Better yet, the application of our technology extends well beyond Year 2000 by setting the standard for maintaining software in the new millennium.

Peritus is developing innovative software tools for use in automated logic extraction, software test generation, and mass change renovations. This is your opportunity to work with leading edge technologies including Client/Server, GUI design and Delphi. Our openings require a BSCS, 3+years' expenence and the following:

TECHNICAL CONSULTANTS - SCHAUMBURG, IL AND BILLERICA, MA

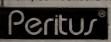
COBOL programming (MVS); systems analysis; IBM mainframe; JCL, CICS, IMS/DC, IMS/DB, DB2. Some travel required.

NETWORK/SYSTEMS ADMINISTRATOR - SCHAUMBURG, IL Sun/OS, Solans, IBM AIX, HP-UX, Windows 95, TCP/IP networking. Also NetBeui, shell scripting, Perl, sendmail, MS Mail, C/C++, DNS, NFS, NIS

#### SOFTWARE ENGINEERS/SR. SOFTWARE ENGINEERS -

C/C++, UNIX shell, compiler construction tools, DB2 or MSCS in lieu of expenence. Sr. level requires 5+ years' (or MSCS and 3+ years') programming, plus CLIPS or rule-heard systems development.

- Other opportunities in Billerica, MA include:
   Project Leaders
   Marketing Specialist
   Webmaster



Respond with resume to: Human Resources, Dept. CW, 304 Concord Road, Billerica, MA 01821-3485; Fax: (508) 670-1173; e-mail: resume @peritus.com; Home of the control of the

# IT'S ABOUT TIME FOR A TOTAL SOLUTION

JANUARY 1, 2000... the new millennium will bring much change. Computer Horizons Corp. is not only anticipating that change, we are solving many of the perplexing problems facing business in the future. For instance, in the year 2000, systems requiring date calculations will fail by either terminating abnormally or by producing incorrect results.

A COMPUTER HORIZONS

TOTAL SOLUTION ... SIGNATURE 2000

Always ahead of our time, we at Computer Horizons Corp. have integrated methodology, management and automated analytical and construction software to address this perplexing problem. This is only one example of how we use our experience and technical know-how to provide total solutions worthy of the Fortune 500 companies who look to us for innovative answers.

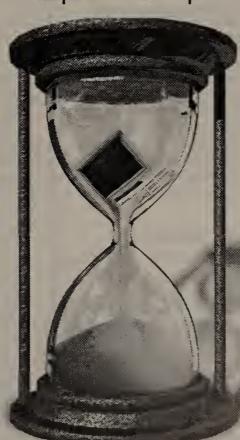
We have grown to be a \$270-million IT leader by partnering with our clients and creating total solutions involving contract staffing, outsourcing, re-engineering, migration/downsizing and network

management. From a worldwide network of 40 offices, we offer a global perspective on how best to integrate servers, mini and mainframe systems, workstations, terminals and communication gateways into host-based or client/server environments.

Isn't it time you talked to a leader whose success is the talk of Wall Street? Our record breaking growth has created opportunities for Sr. Programmer Analysts, Programmer Analysts,



Computer Horizons Corp.



Project Managers and Project Leaders with the business savvy, technical acumen and solid experience in any of the following:

- · IBM MAINFRAME LEGACY SYSTEMS
- · IMS, DB2, IDMS
- · MICROFOCUS COBOL
- . TELON, WINDOWS
- . KNOWLEDGE OF PC TOOLS & PC DBMS

We offer highly competitive salaries and a full benefits package featuring life, medical and dental, education reimbursement, relocation assistance, flexible spending accounts and 401(k) plan.

For immediate consideration, send your resume to:

Computer Horizons Corp. Human Resources Dept-CW 49 Old Bloomfield Avenue Mountain Lakes, NJ 07046-1495 Fax: 201-402-6293

E-mail: mark.walztoni@chc.fabrik.com

An equal opportunity employer.

#### ₩ BARRY UNIVERSITY

Barry University, a Catholic international Enrollment Services. This exciting position involves the development and support of computer platforms designed to enhance recruiting efforts, management of data bases for PCs, tracking market trends, upgrading correspondence systems related to student recruitment/retention, and quality control. Bachelor's degree req., master's prei., 5 yrs. exp. in data base design and planning; 2 yrs. supervisory exp. req. Salary commensurate with education and experience.

Submit resume, references and salary requirements to: Sue Courtade, Assistant Dean, Enrollment Services, Barry University, 11300 NE 2nd Ave., Miami Shores, FL 33161 e-mail: courtade@pcsa01.barry.edu • phone:(305) 899-3129

# D/P JOBS

#### State by State!

http://www. nationaljobbank.com

or Charles H. Kimball **Executive Search** of New England 39 Darling Ave So. Portland, ME 04106

FAX (207) 772-8611





Sprint Personal
Communication Services<sup>™</sup>
(Sprint PCS) is taking bold
strides into the 21st century
as the creative force behind
the evolution of wireless
communications services.

Our corporate headquarters are located in Kansas City, currently ranked one of the most affordable housing markets in the country. Kansas City offers a unique blend of sophistication, friendliness, excellent school systems and cultural excitement, providing an ideal environment in which to raise a family. We have multiple openings with significant areas of responsibility at our Kansas City corporate headquarters for:

# ORACLE RDBMS & EXPRESS DATABASE ADMINISTRATORS

Responsible for Oracle multi-dimensional database and/or RDBMS design and administration. You will provide consultation on Oracle database structures, rules, capabilities and domain values, as well as assistance to developers/users in ensuring proper access, design, operations and problem resolution. Responsibilities include resolving security issues in large and complex databases, ensuring appropriate back-up and recovery procedures for each database design. Oracle Express candidates must have 2 or more years Oracle Express multi-dimensional database design and administration experience. Oracle RDBMS candidates must have 4 or more years database design experience. Back-ground in administering very large databases is a plus. Bachelor's degree in Business/Computer Science preferred. Job Code: ODA

# DIRECTOR OF INFORMATION TECHNOLOGY CUSTOMER SERVICE

Provides Information Technology support to the Sprint PCS "Customer Care" organization. You will act as "CIO" to Customer Care and as its liaison with the Information Technology organization to facilitate development of business systems which will provide functional support and add competitive advantage to the company. The qualified candidate must have in-depth knowledge of customer service business processes, with 10+ years experience directing Information Technology resources and development projects. MBA is highly desirable, especially if the undergraduate degree is in a technical discipline. **Job Code: DCS** 

# PRODUCT LAUNCH TEAM MANAGERS INFORMATION TECHNOLOGY

These positions will be responsible for participating on dedicated cross-functional product development teams to ensure that information technology systems and procedures support the planning and development of Sprint PCS product sets. Immediate positions are available related to call features, wireless messaging, CDMA/AMPS roaming, Over-The-Air Service Provisioning (OTASP) and data applications. The successful candidate will be a high-energy manager with excellent information technology systems knowledge and significant product development expertise. Strong verbal and written communication skills essential. MS in Computer Science/Engineering or an MBA is highly desirable. Job Code: PLT

Sprint PCS offers an outstanding compensation and benefits package. If your career goals are challenge and exploration, then Sprint PCS invites you to share the future with us. Send your resume, specifying job code, to: Sprint PCS, c/o Gore Resource Solutions, Inc., 1475 Buford Dr., Suite 403-220, Lawrenceville, GA 30243, FAX 770-963-3001. No phone calls, please. We are proud to be an EEO/AA employer M/F/D/V. Also, we maintain a drug-free workplace and perform pre-employment substance abuse testing.



**Sprint PCS**<sup>™</sup>

#### **INFORMATION SYSTEMS PROFESSIONALS**

THE CONSORTIUM has been providing quality software developers, systems integration and technical services to major corporations throughout the New Jersey/New York Metropolitan area. Opportunities are available for IS professionals with varied skills and interests. Short Term, Long Term, Right to Hire and Full Time opportunities in the following disciplines:

C++/NT/HTML/JAVA/OOD POWERBUILDER 5.D/PFC VISUAL C++/CORBA/OO/NT C++/UNIX/TCP/IP/OOD RATIONAL ROSE/C++/OS/2 ORACLE/SYBASE/DEVELDPERS

VISUAL BASIC 4.0/ODBC/CICS/VSAM BTRIEVE/MICROFOCUS COBOL COBOL II/DB2/CICS/IMS YEAR 2000 Mgr. & P/A NCP/VTAM/MVS/SYS. PROG. AS/400/JD EDWARDS/RPG/COBOL UNIX/HP-UX/AIX System Admin. QA-TESTERS NT/LAN/ENGINEERS VISUAL BASIC/ACCESS REMOTE ACCESS/SHIVA

LOTUS NOTES Developers & Admin. DATA/VOICE/PBX NOVELL 4.X ADMIN & SUPPORT UNIX/PRE-SALES SUPPORT SYBASE/ORACLE OBAS

For more information contact:

## TCE CONSORTIUM The People Company

Rick Cielo, Consulting Division NJ Mike Farber, Permanent Division NJ 277 Fairfield Rd., Fairfield, NJ D7D04 (201) 227-37DD FAX: (201) 882-7704 Alex Valcic, Consulting Division NY Jeff Goldman, Permanent Division NY 1156 Ave. of the Americas, NY, NY 10036 (212) 221-1544 FAX: (212) 764-6848

[ A Continuing Discussion ]

#### **The Cool Objects Connection**



#### We Were Just Discussing You...



At The Technical Resource Connection, good architects, designer/developers, and modelers are never far from our thoughts. And we do more than talk about technologists—we hire them.

800-872-2992 ■ Fax: 813-891-6138 http://www.trcinc.com/jobs/cw1 ■ e-mail: staffing@trcinc.com

Call, or fax or e-mail your resume to:
The Technical Resource Connection, Inc.,
a wholly owned subsidiary of Perot Systems Corporation

Programmer Analyst - Develop, modify & test computer programs. Discuss requirements with user, study applications, make time estimates for application changes. Analyze, review & modify programs. Test & run programs. Use code debugging tools. Use MVS/ESA, COBOL, JCL, VSAM, IMS, IBM mainframe. MUST HAVE: Bachelor's or equiv. in Comp. Sci., Engineering, Physics or Math. 2 yrs exp. in job offered or 2 yrs exp. as Programmer Analyst &/or Software Engineer. Must have working knowledge of all above hardware/software. \$55K. 9-5, 40 hrs/wk. Dub Location: Tallahasee, FL. Submit resume to Dept. of Labor/Bureau of Operations, 1320 Executive Center Dr., Atkins Rm. 244, Tallahassee, FL 32399-0667, Ref. Job Order #FL-1525050.

# DATALINK

IS JOBS!

DATALINK 153 Waverly Place New York, NY 10014 PH (212) 243-5488 FAX (212) 989-6457

mail: datalink1@worldnet.att.net

#### Meet the Challenge

AMDOCS is a rapidly expanding, international developer of large, customized information systems for telecommunications companies. Currently we have openings for specific positions in the Washington, D.C. Metro Area:

#### Programmer/Analyst

Qualified candidates will have a 2+ years experience in a mainframe environment. Knowledge of TSO/ISPE, OS/JCL and DB2/SQL is preferred.

#### **Project Manager**

Qualified candidates will have 10+ years experience in developing and implementing large scale long-term applications, be customer service oriented, have managed at least 10 people, possess leadership qualities with sharp business & analytical skills.

Benefits include competitive compensation, merit bonuses, medical, dental, vision, life, FSA, disability and a 401K savings plan.

Fax or mail resume to: AMDOCS Inc.

On the Web at http://www.amdocs.com

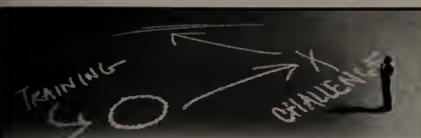


Attn: Rick Kiwus
Technical Directions
3030 LBJ Freeway
Suite 910
Dallas, TX 75234
Fax. 972-243-5642
EOE

SOFTWARE ENGINEER. Analyze software requirements to determine feasibility of design within time and cost constraints. Discuss with management & develop program spec's & database structures from functional and data models. Create prototypes using "Smart Objects" technology, Bourne, Korn, Cshell scripts and Perl. Design & develop software for manufactur. & cellular telephone companies using OOD methodology in Progress 8 RDBMS, C/C++ and UNIX/Windows 95 client/server environment. Evaluate system performance under different operating systems (HP-UX, Solaris, AT&T UNIX, AIX, SCO), hardware (HP9000, Sun Sparc, IBM RS/6000) and network (TCP/IP, SPX) configurations. Develop context-sensitive help systems, perform data conversions, coordinate software installation and testing at customer sites. Must have good understanding of client/server architecture, relational database theory, object-oriented and event-driven programming techniques. Must be willing to relocate within the U.S. on a project-by-project basis. Required computer applications: Progress 8 GUI development, User Interface Builder, Results, Data Servers and DBA experience. Knowledge of RCS, SCCS or similar revision control systems. C/C++, Bourne shell, Korn shell, C-shell, Perl, Sed, Awk programming. Unix System Administration, Windows 95, Windows NT. Must have Bachelor's Degree or equiv. in Electronics Engineer, or related, 7 months training in C/Advanced Unix for 'C', and 6 years' work experience. Hrs: 9a-5p. M-F, \$34,000 per yr. Apply to Georgia Dept. of Labor, Job Order #GA 6049399, 2943. N. Druid Hills Rd., Atlanta, GA 30329-3909 or the nearest Dept. of Labor Field Service Office.



http://careers.computerworld.com



# We have big plans for you. Promise.

Compuware is one of the 15 largest independent software vendors in the world and a professional services provider of acknowledged excellence. Services revenues increased more than 30% last year, as we expanded our product offerings, and devised a year 2000 date-change solution. With us, you'll have an opportunity to work on the kind of exciting assignments that expose you to a diversity of technologies, industries, corporate cultures and management styles. If you need to be at the forefront of the IT industry and are ready to make a change for the better, join our respected team today.

#### Year 2000 Conversion Opportunities

Excellent opportunities are available for IT professionals worldwide. Year 2000 conversion opportunities exist in the following Compuware locations:

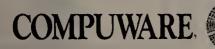
> Appleton, WI Madison, WI Baltimore, MD Washington, D.C.

Cleveland, OH Detroit, MI

Minneapolis, MN

**Nationwide Travel Positions** 

Now is the right time to plan your future with one of the industry's most successful and fastest-growing organizations. We offer a comprehensive salary/benefits package and advancement potential. Don't delay! Send your resume immediately referring to ad #CW36 and indicating your location preference to: Compuware Corporation, Fax 800-871-0401. E-mail: careers@compuware.com



An equal opportunity employer.

Senior Programmer Analyst (Orlando, FL): Analyze, design, develop, test & implement an inventory tracking & billing system software application for mainframe and mid-size computers. Analyze business procedures & requirements. Design & develop software applications using NATURAL language, ADABAS database, VM/ESA operating system, CONSTR-UCT, PREDICT. Translate existing system into object oriented system using NATURAL language & Object Oriented Concepts & Design. Test all developed applications for efficiency, compatibility & usability Documents software applications at each stage of development, 40 hrs/wk, 9am-5pm; \$50,000/Yr. Must have a Bachelor's in Computer Science or Data Processing & 2 yrs exp in job offered or 2 yrs exp as Programmer Analyst. Through education or work exp must have acquired software development skills in each of the following: 1) NATURAL; 2) ADABAS; 3) VMESA; 4) CONSTRUCT; & 5) PREDICT. Must be willing to travel to client sites throughout PREDICT. Must be willing to travel to client sites throughout the U.S. 15-25% of the time. In acceptable if accompanied by an additional 3 yrs exp as a computer programmer analyst. Send resume/fitr in dupl to: Job Service of Florida, 1001 Executive Center Drive, Orlando, FL 32803-3520, RE: Job order # FL-1527269.

# **YEAR 2000**

perienced software product salesmen or marketing reps--join our sales efforts for Year 2000 conversions on a national basis with MIS INTERNATIONAL Excellent commission structure. See our product. "HOT ICE," described in our ad on page 109 for further infor-

MIS INTERNATIONAL INC. 445 Enterprise Court comfield Hills, MI 48302 Fax your resume to: 810/253-9506

### Advanced Technology. Traditional Success.

Steady growth requires the expansion of our I.S. Division to meet the ever-challenging technology requirements of our business. As a very successful provider of life insurance and retirement plans for more than four million customers nationwide, Standard Insurance Company is currently seeking IS professionals with broad based expertise and a commitment to innovation. When you join us, you'll experience a team-based, customer service-oriented environment with outstanding career opportunities in a growing company, recently named one of Oregon's top 100 employers. Currently, we have these NEW positions available:

#### DATABASE ADMINISTRATOR **DATA ANALYSTS** PROCESS ANALYSTS **SOFTWARE DEVELOPERS WEBMASTER**

Resumes may be sent to B. Lyman, Standard Insurance Company, (indicate position of interest), 1100 SW Sixth Avenue, L-2 Human Resources, Portland, OR 97204, Fax to (503) 321-7757, or e-mail to blyman@standard.com For further information on these positions, call (503) 321-7314. Equal Opportunity Employer.

STANDARD INSURANCE COMPANY

People. Not just policies.®

#### KEEN TO JOIN A COMPANY IMPLEMENTING SAP R/3?

SAUDI ARABIA

ATTRACTIVE TAX FREE SALARY AND BENEFITS



(Hadeed)

HADEED, an ISO Certified Company is based in the Industrial City of Al-Jubail in the Eastern Province of Saudi Arabia. They operate an integrated iron and steel complex employing a multinational workforce of over 2,500 people. The plant uses state-of-the-art technology to produce steel billets, reinforcing bars, wire rod and light sections. In little more than ten years, the plant has achieved production levels of over 2.5 million tonnes per annum and is now rated as one of the most efficient steel producers in the world. They are in the process of implementing all SAP R/3 modules and extending their FDDI Network

**Head of Application Systems** 

You will be responsible for the analysis and implementation of Hadeed's users information systems requirements, leading a team of Application Specialists and Business Analysts, to support various SAP modules and Prime based applications.

**Head of Technical Systems Support** 

You will provide network and operational support for various systems. Experience in Capacity Planning, Project Management and Network Management is essential. UNIX, ORACLE and Network experience is required.

Senior Network and Communications Specialist

You will provide hardware, network and operational support for the user systems. Experience in Capacity Planning, Project Management & Network Management is essential. Also required is experience in NOVELL and WINDOWS NT.

**Systems Security Specialist** 

You will be responsible for data security and access control for all the systems and services, together with development of systems security procedures for all Computer Applications. UNIX, ORACLE and WINDOWS NT preferred.

**Quality Assurance Specialist** 

You will be responsible for the development of QA standards for all systems in the company. You must ensure that the necessary organisation and control is available to maintain high quality standards. Experience in system development and implementation methodologies is required.

**Database Administrator** 

You will provide Systems Administration, Database and UNIX Technical Support. HP/UX and ORACLE are essential. SAP Basis experience is desirable.

**End User Computing Specialist** 

To support various Desktop applications, e.g. Microsoft Office. Web page experience is preferred.

ABAP/4 Analysts/Programmers
Specific tasks will include applications interfacing and conversion of existing PRIME based systems using SAP ABAP/4. Responsibilities include design, construction and program testing, advising on software tools, packages and implementation plans. Candidates should have good development and implementation experience, using high level languages with RDBMS and structured methodologies. ABAP/4 experience is strongly preferred.

Hadeed offers Tax-free salaries, special project bonus, free air conditioned accommodation, free medical, free utilities, insurance coverage, free return ticket for yearly holiday. Single or married status renewable contract etc.

For further details please send CV to our UK agent, Roger Allington at Dalroth International, Nightingale House, 46-48 East Street, Epsom, Surrey, KT17 111Q. Email: jobs@dalroth.win-uk.net, Tel: UK + 1372 726299, Fax: UK + 1372 744020

Senior Systems Engineer Atlanta, GA to analyze existing systems to evaluate effectiveness and design systems to improve data processing using advanced mathematical/numerical analyses and computer methodology. Coordinate system testing and programming, including providing technical direction to programmers, performing system software and complex coding using UNIX, C and network communication libraries. Research system problems. Consult with engineering staff to evaluate interface between hardware and software, and operational and performance requirements. Assist client users with project planning. M-F. 8:00-5:00, 40 hrs./wk. \$65,000/annum. Require MS in Computer Engineering or Equiv. Education and three years exp. in the job offered or three years exp. as a Software Engineer, Applications Developer, Software Consultant or Equivalent including performance evaluation of real-time systems based on UNIX interdevelopment including performance evaluation of real-time systems based on UNIX internals, TCP/IP, C, C++ and SOL. Must be experienced in finite state machines. Send Two resumes or apply in person to Georgia Department of Labor, Job Order #GA 6045911, 2943 N. Druid Hills Road, Atlanta, GA 30329-3909 or the nearest Department of Labor Field Services Office. Must have proof of legal authority to work in the U.S. An Employer Paid ad.

# NTRACTORS www.winterwyman.com

#### **INFORMATION SYSTEMS**

- · Oracle Developers & DBA's
- Oracle Financials
- Messaging, cc:Mail, Notes Organizer (Win 3.x. Win95 and NT)
- MS Access, Visual Basic
- SAS: VAX/VMS, MVS (Pharmaceutical exp.)
- Lotus Notes Administrator (R3, R4)
- Lotus Notes Developers • Unix Systems Administrator (Sun, Solaris)
- · Delphi Developers
- Data Warehousing (Oracle/Sybase) NT and Novell Administrators

204 Second Avenue, Waltham, MA 02154 Email: contract@winterwyman-contract.con

#### **SOFTWARE ENGINEERING**

• 0-0 Architect, Visual C++, NT

• Visual C++, NT, Win'95, device driver

- C++, UNIX, RPC, sockets
- · C++, UNIX, Oracle replication
- · JAVA and JAVA Script on NT . Visual Basic, ActiveX, OLE, NT
- · UNIX, realtime, embedded development
- Internationalization (double-byte enabling)
- OA: NT ROBMS 0-0
- . QA: VMS, UNIX, manual testing
- . QA: Motif, UNIX. C. manual testing
- OA, MS-Test, SQA Robot, internet product

#### Winter, Wyman Contract Services BOSTON AND NATIONAL CONTRACTS:

Contact: March Mansell 770-933-1525 Fax. 770-933-1526 1100 Circle 75 Pkwy Ste 800 Dept. CW Atlanta, GA 30339



#### Do you possess above average skills?

The name Andersen Consulting is synonymous with a prestigious international leader and is recognized as one of the most distinguished firms in the industry. In leading the pack, Andersen Consulting's continuous success has created excellent opportunities for business professionals to leverage their highly specialized skills.

At Andersen Consulting, the typical consulting environment is anything but typical. Working with wide ranging technology, our highly visible consultants act as leaders of leaders, applying the breadth of their professional experience to situations beyond the norm. For those at the top of their game, where else could one work in a dynamic industry such as Utilities, which is undergoing such dramatic transformation. It is a unique chance to develop professionally by joining a high caliber team of over 2,500 Andersen Consulting Utilities professionals. Our Utilities Business Process Managers help develop process design principles and technology innovation to make clients more successful through business software solutions. We are currently seeking professionals with the following skills:

#### **Business Process Project Managers**

- Utilities Industry Group -
- Customer Information Systems or Financial Systems expertise
- Management professionals with 6-12 years Business Process experience
- Solid Project Management experience
- Utilities industry and consulting experience preferred
- ·Work authorization is required

These positions are based in the East, Midwest and South regions of the U.S.

To complement distinctive team-oriented environments, existing expertise will be augmented with ongoing professional training provided by the firm. If you are looking to be challenged by working in highly advanced and complex environments and possess exceptional technical, verbal/written communication, organizational and interpersonal skills, Andersen Consulting may be what you are looking for. Please forward your resume and salary history, indicating location preference, to:

Andersen Consulting Attn: Brin Stevens/CW129 Spear Street Tower, Suite 3500 One Market Plaza San Francisco, CA 94105 Fax: (415) 281-1700 For more information, please visit our web site at http://www.ac.com Andersen Consulting Is An Equal Opportunity Employer ©1996 Andersen Consulting



### We have the Tools... You... the desire, skills, and experience

Systems2000 provides to its clients, exceptional automated tools, project management, methodologies, and solutions oriented professionals.

Our winning team is focused on the largest project effort in history - Millennium conversions. To be a part of this exciting effort, we anticipate additional roles in the areas of

#### \* Technology Leads \* Project Leaders \* Analysts \* Programmer Analysts

for individueds with hands-on experience in Mainframe databases COBOL, CICS, REXX, CLIST.

If you are a solutions thinker, who enjoys being a part of a solutions team, we want to hear from you.

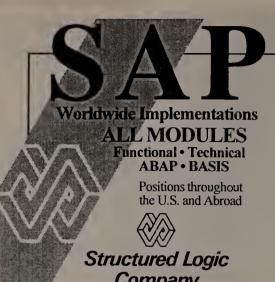
We offer full-time employment, competitive salary, bonuses based on deliverables, and a company paid benefits package.

Please send your resume with salary history to:

Systems Engineering Services Cor Systems2000 Technology Division 5299 DTC Bouleyard, Suite 320 Englewood, CO 80111 Tel: 800-499-7372-ext. 16 (303) 290-8288 e-mail: sys2000@rmi.net Fax: (303) 290-8285

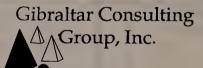
Positions available in Denver, CO, Reston, VA, Washington, DC, Atlanta, GA, and Minneapolis, MN.

Senior Software Engineer. Design & dvlop prgrams for massively parallel stress tsts for PCI based supercomputers using message pass'g protocols & distributed procss'g; design & dvlop distributed client server tchnlgy for high lvl stress tsts for hrdwr & sftwr components of supercomputers; implmnt distribut'n of a hrdwr stress & tst'g systm across supercomputer infrastrctre using RPC interface & client server tchnlgy; apply knwldge of client server thwrk mangmnt sftwr to design tst ntwrk interfaces to automate test'g process of supercomputers; & write on-line stress tsts for Ethernet & ATM using ntwrk device drivers to evaluate stress actvty. BS in Comp Science or Comp Engng (or foreign equiv) + 7 yrs exp either in job offered or as Sftwr Engnr or an MS (or foreign equiv) in same fields of study + 5 yrs exp in job offered or as Sftwr Engnr. Grad crsework, grad rsrch, or work exp must have prvded hands-on bckgrnd in follw'g: Design & dvlp client server ntwrk mngmnt sftwr; dvlp & tst using ntwrk device drivers; dis-Senior Software Engineer. Design ntwrk mngmnt sftwr; dvlp & tst using ntwrk device drivers; distributed procss'g & message pass'g protocols; RPC; PCI bus protocol; on-line stress tst'g. Job loc: Beaverton, OR; min 40 hr/wk; \$5,083/mo. + relocatin expenses Qual applicits send res to: Emp. Dept., Attn: J.O. #5551365. 875 Union St., NE Rm 201, Salem OR 97311. Resume &/or cover letter mst reflect every listed requirmnt or it will be rejected. Applicant mst hv legl auth. to prmanently wrk in US. Comp is an Equal Opp emp & flly spprts affirm. action



Company

1975 North Park Place Atlanta, GA 30339 800/599-9550 770/955-1714 FAX: 770/937-0423 e-mail: slc11@aol.com MEMBER NACCB



#### **WE FIND JOBS**

Information Systems Professionals

#### **Permanent & Contract**

- Salaries from 35k-125k
- Fortune 500 Companies P/A's to VP/CIO
- Excellent Salaries
- Great Benefits
- 150+ Positions Available

Call Today or Fax Resume: 1-800-748-7595 / Fax 615-383-7091 HTTP: www.gibrltar.com

#### Free Skill Resume Distribution

Since 1994, over 15,000 experienced computer professionals have used Skill Scan to promote their skills. By submitting your resume you will reach 100+ of the nation's top agencies/consulting firms as part of our weekly CD-ROM database. (and it's free!)

FAX: (800) 369-4067 resource@in.net www.in.net/careers Systems Analyst needed for Computer Consulting Firm located in Tampa, Florida. Job duties include. Design, develop, implement, test, maintain and enhance a variety of software utilizing C, C++, X-Windows/Motif, GUI, Shell Scripting, Informix and other relational databases on UNIX platforms using standard development and programming methodologies. Confer with users to define system requests by the analysis of application-related problems. Analyze and implement software applications utilizing electro mechanical apparatus. Unit test programs by successive runs using testing scripts. Plan and prepare technical reports, memos, and instructional manuals relative to the operation of the program and the system. Applicant must have B.S. degree in Computer Science. Applicant must also have 1 yr. of exp. in the job duties described above or 1 yr. eya sa Systems Analyst or Graduate Assistant. 1 yr. exp. must include 1 yr. of exp. or course work in C, C++, GUI, Shell Scripting and X-Windows/Motif on UNIX platform. 40hrs; Wk, 8:00 am - 5:00 pm, Mon-Fri, \$45,028/yr. Send resume and cover letter to Job Service of Florida, 2312 GuIf-To-Bay Blvd., P.O. Box C, Clearwater, FL 34618-4090, RE: Job order number FL-1522792. ber FL-1522792.



ttp://careel 'S.Computerworld

#### **INFORMATION SYSTEMS PROJECT MANAGER**

Unique opportunity for qualified Individual to Join an exciting team of professionals in the dialysis Industry at our corporate location. This person will have 5+ years of experience with AIX In a risc environment. Data communication and NT Server experience a necessity. BS Degree In Computer Science, strong leadership and communication skills desired. Very competitive benefits package with an excellent educational program, including tuition assistance. Must be willing to travel. Salary \$55K.

Please send resume to:

QualiCenters, Inc. Human Resources Dept. 4860 Robb Street, Suite 205 WheatRidge, CO 80033

ALICENTERS

## **IBM** Mainframe Consultants

Hi Tech Consultants, Inc.(HTC), an international software development and computer consulting organization with over 100 professionals working in USA, needs Project Leaders, Programmers, Analysts and DBAs. The requirements exist for:

- Year 2000 Skills
- IMS DB/DC, IDMS, ADSO, DB2, VSAM, NATURAL ADABASE
- CICS, TELON
- JCL, REXX, CLIST
- COBOL, PL/I

HTC offers attractive salary and benefits. Consultants currently working outside US will also be considered. If you have 2-8 years of relevant experience, please fax or email(text format) your resume giving ref. 96/12/CW to:

Resource Manager, Hi Tech Consultants, Inc. 26877 Northwestern Hwy Ste. 208 Southfield, MI 48034-6281, USA

Fax: +1-810-355-3366 Tel: +1-810-355-2500 E-Mail:74227.2163@ compuserve.com

OR hitech@mich.com



# WITH TRECOM, YOUR EXPERIENCE IS NEVER OUTDATED

# YEAR 2000 SOLUTIONS - AND BEYOND UNPRECEDENTED GROWTH

#### A PLAN FOR YOUR FUTURE, INCLUDING IN-HOUSE TRAINING

Thanks to TRECOM and APM/2000, you can apply your technical expertise in new and innovative ways! Proven professionals like you are in a position to take advantage of one of the biggest opportunities in Information Systems in more than a decade. TRECOM Business Systems Inc., one of the nation's most successful systems integrators and solutions providers, is ready with a unique solution known as APM/2000. APM/2000 provides the management, methodology, and tools for implementing the century change effectively.

And when the millennium ends, the challenge goes on as TRECOM continues to invest in your future. You'll have the opportunity to apply your experience as part of our Outsourcing Business and receive client/server training in our corporate training facility. You'll learn about PowerBuilder, Visual Basic, Lotus Notes, NT, Sybase, Oracle and other leading edge technologies.

The application of APM/2000 solutions depends on seasoned professionals who have proven project management experience with both small and large scale systems. We have opportunities nationwide in the following areas:

#### LANGUAGE SPECIALISTS

- COBOL Assembler • IMS-DL/1
- PL/1 • DB2
- CICS

#### DATABASE ADMINISTRATORS

- DB2
- IMS
- ADABAS
- IDMS

#### Y2K STRATEGIC AND CAPACITY PLANNERS

• Mainframe • AS 400

• UNIX environments

#### PROJECT MANAGERS

Join the organization that is experiencing 40% annual growth. If you have experience in the technologies listed above, we need you now! Please send your resume to: V.P. Corporate Resource Management, TRECOM Business Systems Inc., 333 Thornall St., Edison, NJ 08837; Fax: (908) 549-6519; E-mail: careers@trecom.com An equal opportunity employer.

**Business Systems Inc.** 

An Amdahl Company

AL • CA • CT • FL • GA • MA • NJ • NY • TX • Washington, D.C.

Systems Analyst - Analyze reqs. design, develop & implement Info. Mgment systems on IBM/MVS hardware using DB2, CICS and COBOL. Define & establish DB2 database structures. Prepare program specs. & systems Docs Requires Bach. systems Docs Requires Bach.
In Comp. Sci., Math or any Engr.
field and 2 yrs exp which
includes 1 yr exp using ADW
Case Tool. Employer is a computer consulting firm. Relocation
to various client sites for periods
of 6 mos to 2 yr required. M.F. of 6 mos to 2 yr. required M-F, 40 hrs/wk, 8AM-5PM, \$70,000/ yr. Send resume to Job Service of Florida, 1001 Executive Center Dr., Orlando, FL 32803-3520 Re JO# FL- 1522411

#### Sales/Marketing

#### **New Worldwide** Resources, Inc.

A growing Information Services Consulting & Offshore Development Firm with offices in NJ & India. We are seeking Sales:Marketing Consultants nationwide, either on commissions of the Parketing Consultants and Consultants in the Parketing Consultants and C sion or salary basis

Please fax resume to 24 Campus Plaza Raritan Center Edison, NJ 08837

908-417-5141 E-mail: balajır@aol.com

#### Consultants

8PR is currently recruiting Sr. Bank Consultants with the following expended Hogan Deposit, CAMS, PAS Shaw - Installment, Commercial Check Processing CPCS

We need Technical & Functional Resources. Our clients are located nationwide. Must be willing to trave extensively.

#### Becker

Project Resources, Inc.

4526 SW Tarlow Ct., Portland, OR 97221, PH: (888) 246-6500 FAX: (800) 482-3388 jsbecker@bpr.com, www.bpr.com



system using multi-layered client server architecture Database design & application develop-ment Tools: Oracle DBMS Forms, SQL Reports, Windows NT, Pro\*C PL SQL, UNIX, M.S. in Computer Science as well as 1 yr exp. in job offered or as Research Engineer required Previous exp must include data Previous exp. must include data base design application development. Oracle Pro\*C SQL PL/SQL, UNIX 40 hrs/ws 3mm-5pm S44.000 yr Must have proof of legal authority to work permanently in the U.S. Send resume to. Joan Baril. The Serdona Group 612 va.ey V.w. U. re. M. e. 1. 61265 33.9. 797-9785 RE # 120996

# INFORMATION OFFICER

Newly created opportunity to be a part of the senior management team in developing and implementing an IS strategy to meet the needs of a growing HMO. This talented individual will work closely with all levels of staff to create solutions to business challenges. This is an exciting and challenging opportunity for a team-based, results oriented individual to take the Company to the next level of systems development by ensuring that the Company's strategic and tactical plans are achieved. Qualifications include a bachelor's degree in Computer Science, a minimum of 10 years broad based experience in data processing with a minimum of three years experience in a mainframe environment, with experience in managed care setting preferred. The CIO has management responsibilities for the IS Department including an active Applications Development group, on-site data center operations and an extensive wide-area Network in New Orleans and throughout the State.

We offer competitive salary plus comprehensive benefit package. Qualified candidates interested in pursuing this position on our management team should send resume and cover letter indicating salary requirements to: Ochsner Health Plan, Attn: Human Resources Department #29,1 Galleria Blvd., Suite 1224, Metairie, LA 70001. Fax: (504) 836-5536.

#### CHSNER HEALTH PLAN

Equal Opportunity/Affirmative Action Employer



#### The University of Mississippi

Oxford • Jackson • Tupelo • Southaven

ASSOCIATE PROVOST FOR INFORMATION TECHNOLOGIES

The University of Mississippi seeks applicants for the position of Associate Provost (AP) for Information Technologies. The AP reports to the Provost and manages a staff of 109 with a \$7.9 mullion annual budget. Requirements: Excellent interpersonal and oral/written communication skills; experience with, and commitment to, participatory management; proven record (at least five years) in planning and problem solving, managing complex technological resources, managing budgets, and managing a diverse information technologies staff; knowledge and experience with nformation and telecommunications technology; and a Master's Degree in an appropriate discipline.

For additional information, see url http://www.olemiss.edu/ itsearch or contact Robert D. Sindelar, Ph.D., via e-mail to mcrds@ cotton.vislab.olemiss.edu

The University of Mississippi is an AA/ADA/EOE.

# 

We are an 18 yr. old national consulting firm specializing in Y2K conversions and need 50 COBOL Programmers and Project Managers nationwide.

Get training in Y2K tools. We have low overhead, so we can pay you TOP rates.



Fax: (617) 861-8429

EOE

#### People Unlimited

1811 Sardis Rd. N., Ste. 210, Charlatte, NC 28270 7 Phone: 704-841-1135 • Fax: 704-845-1052

between 7:30 A.M. - 6:00 P.M.

If you would like to combine your professional experience as a mainframe COBOL Programmer/ Analyst with your interest in skiing or other SKIERS outdoor activities-call us. Our client is located in a picturesque college town in the VT/NH ski region. They seek 10 COBOL Developers from Programmer to Project Leader. They ROBERT HALF offer full relocation and highly competitive salaries in a profitable, grow-Information Systems ing business enterprise. For imme-430 Declard Street diace consideration call Frank LIKINGTON, MA 02171 Tel: (617) 862-1300 Goldschmidt or Steve Rock

www.cweb.com

#### Top companies looking for top people. Interested?

Career

To list jobs call 800-871-0800, visit our web site or e-mail info@cweb.com

# Pocific Doto Group

PDG's aggressive positioning has opened up a large market of client/server opportunities. PDG's strong presence in the mainframe market continues to thrive with new clients driving our growth.

Our 9 years of double digit growth & market leadership is due to our strong ethics, skilled employees & ability to offer top pay. PDG offers an attractive compensation & benefits package. For immediate consideration, mail, fax or e-mail your resume to:

Pacific Data Group, Inc., 10300 SW Greenburg Road, Suite 230, Dept C, Portland, OR 97223 Fax: (S03) 293-3898. Tel: (S03) 293-2499. • IMS DB/DC

Internet: recruiter@pacificdata.com Web: http://www.teleport.com/~pdg Equal Opportunity Employer

· Year 2000

- · Oracle Version 7
- Designer/2000
- Developer/2000
- · Oracle Financials/HR
- · Visual Basic/Access
- Powerbuilder



- DB2, CSP
- CICS, COBOL

- Natural/ADABAS

#### COMPUTER CONSULTANTS

Celebrate Christmas with a new job at JMRoss. Call us today for contract & permanent postions.

#### Prog/Analyst

Sys Admin. VAX UNIX (AIX) PC Specialist
MAC/IBM Help Desk

est

orthw

a

Oracle & DBA Visual Basic Cobol, MVS,CICS Cyborg

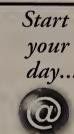
**BPCs** RPG/400



JMRoss & Associates, Inc. 9417 Lackland Rd. Overland, MO 63114 314-429-7600 (fax) 1-888-429-7677 (toll free) DPJOBS2@aol.com

http://www.resourcecenter.com/jmross

Consultant. Design, develop, implement & test software for management information systems in a client/server environment. Database design. Tools: Powerbuilder, SQL Server, ORACLE, Novell, Visual C++, Windows NT Advanced Server, ERWIN/ERX, HTML, Internet & Java programming, mainframe computers. 40 hrs/wk, 9am - 5pm. \$45,000/yr. B.S. in Computer Science plus'1 yr in job offered or as a Programmer required. Previous experience must include: Powerbuilder, SQL Server, Novell, Windows NT Advanced Server. Submit resumes to the following address: Job Service of Florida, 1320 Executive Cntr. Dr., Rm. 244, Tallahassee, FL 32399, Attn: Sonia Clark, Job order number FL-1525553.



#### COMPUTERWORLD

www.computerworld.com

http://careers.computerworld.com



# Start your day...



www.computerworld.com

TRAINING

## Instructors Positions available throughout the US

Are you looking for an exciting, fast-paced, leading-edge opportunity supporting the delivery of World Class education?

SAP is launching a New Generation of Education for its customers, using state-of-the-art instructional techniques and technology. To ensure the success of this new program, we are seeking exceptional individuals to become SAP R/3 Instructors. Though helpful, no R/3 experience is required. Chosen candidates for these positions will take part in our extensive R/3 training course.

Applicants should have the following skills:

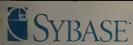
- Experience in presenting technical subject matter and facilitating student learning
- · Experience teaching a business software application or computer operating system
- Experience implementing software applications in the following areas:
- Human Resources
- Sales/Order Processing & Distribution
- Manufacturing
- Financial
- Excellent communication skills
- Some travel required
- Advanced degree preferred (MBA, M.S. Education)

SAP's dedication to superior technology has made us one of the largest, most successful and fastest growing software companies in the world. Come join us for an exciting career in linking people with technology. Please forward/fax your resume to: Brooke Conlan, SAP America, Inc.,

Dept. MCW14996, 701 Lee Road, Suite 200, Wayne, PA 19087, FAX: (610) **725-4390.** Please include your salary requirements. **Equal Opportunity Employer** M/F/D/V. Principals only. No phone calls please.



Integrated software. Worldwide."



STBASE, INC. is a key provider of enterprise-to-desktop solutions within seven key verticals, including financial services, insurance, telecommunications, healthcare, energy, medio & publishing and the public sector. According to a recent article in Computer Business Review, "analysts agree that STBASE is in the strangest product cycle in its history." Came take advantage of this appartunity. Do fai yourself what we do fai our customers:

SYBASE is actively recruiting technical soles professionals in the following locations: New York, New Jersey, Burlington, Concord, Bethesda, Atlanta, Tampa, Memphis, Chicaga, Dallos, Houston, Philadelphia, Charlotte, Detroit, Minneapolis, Colanada Spgs., Denver, Los Angeles, Boy Area, Silican Valley and Toronto

#### **MAJOR ACCOUNTS MANAGERS**

- Manage the total solution sale of the full range of SYBASE products and professional services
   Coordinate the activity of other SYBASE product fine sales representatives within existing major accounts.
- Manage the use of technical resources during the soles process Travel to customer sites in order to assess problems and needs

- five years experience in selling technical solution
   Proven track record of over-achievement of quota
- Excellent team-building, organizational and presentation skilfs

#### **SYSTEMS CONSULTANTS**

- Technically qualify and help clase sales apportunities
   Deliver pre-sales technical support
- Develop Sybase solutions to custamer business problems
- Construct proof of concept application architectures

- At least three years experience in a sales or application development environment
   A working knowledge of Unix, PC's (NT a plus), networking, programming languages, GUI tools and RDBMS.
- Experience doing customer presentations and trouble-shooting

STACE offers an excellent compensation plant as well as a compensative, careferral style dendrits package. For immediate consideration, please forward your resume to SYBASE, 8755 W. Higgins Rd., Suite 1100, Chicago, IL 60631, Ann. Pomelo Pietro.

Fax: 312-864-7261 or Email: ppietro@sybase.com Visit us on the Web for more information at http://www.sybase.com

Equal Opportunity Employer, Affirmative Action



# RIDE THE WAVE

#### FROM YEAR 2000 TO YOUR CAREER 2001

#### IT COULD BE THE WAVE OF YOUR FUTURE. BUT FIRST YOU HAVE TO CATCH IT.

That's why the time is now to join the dynamic, rapidly growing Year 2000 Service Line at Ernst & Young's Management Consulting Practice—and advance your career when the phenomenon is behind us.

Ernst & Young is one of the world's leading integrated professional services firms. We're looking for highly motivated information technology professionals for these exciting opportunities:

SENIOR APPLICATIONS PROGRAMMERS—We are looking for professionals to join our Year 2000 Service Line located at our Accelerated Conversion Center in Costa Mesa, CA as well as in major cities throughout the U.S. You'll need 5-10 years of experience in MVS JCL, IMS, DB2, CICS, TSO/ISPF/SDSF, utilities and COBOL. (Other database management systems a plus.)

For positions located in our Accelerated Conversion Center, you will be part of the resident infrastructure. Minimal travel will be required. In the other positions, you will be part of a special consulting team assisting in the assessment and conversion of client software to be Year 2000 compliant. While assisting on multiple projects, you must be able to communicate within all levels of the client organization. Travel is required.

Ernst & Young offers impressive and competitive compensation packages complete with bonus, medical benefits, and 401(K). What's more, we'll provide you with transitional training that will develop your professional credentials, including valuable consulting skills after the Year 2000 phenomenon is behind us. The potential beyond 2000 is outstanding.

If you'd like to be part of the powerful, expanding team at Ernst & Young, please send your resume, including salary history and preferred location, to: Director of Recruiting, Ernst & Young LLP, Dept. 2000, 1200 Skylight Office Tower, 1660 W. Second St., Cleveland, OH 44113; Fax: 216/622-1483

#### **II ERNST & YOUNG LLP**

An equal opportunity employer, Ernst & Young values the diversity and the knowledge of our people.

SENIOR SOFTWARE ENGIN-EER - VOICE APPLICATIONS. Design and develop voice auto-mation applications by utilizing IBM OS/2 and UNIX OS based computers, "C" and 4GL voice scripting tools. Conduct logical analysis of complex problems and provide solutions by leading small

analysis of complex problems and provide solutions by leading small teams or by working independently. Analyze, review and rewrite existing voice automation programs to increase operating efficiency. Support existing software modules including user-interface, enhancing the features of the module, and correcting bugs in the module. Provide support for end customers by providing end customers by providing expertise about the assigned softexpertise about the assigned soft-ware modules. Interact with cus-tomers to identify and resolve problem areas. Diagnose, define and resolve software problems and provide support in finding hardware problems. Provide spec-ifications, documentation and cus-tomer support. Prepare, track and update development schedules for entire project. Research com-petitor voice automation systems and make recommendations. Requires a Bachelor's degree in Computer Science or Electrical Engineering or Computer Engin-eering and three years experience in job offered or three years direct-ly related real-time multi-tasking software engineering experience ly related real-time multi-tasking software engineering experience utilizing "C" or C++. Or will consider a Master's degree in Computer Science or Electrical Engineering or Computer Engineering and one year experience in job offered or one year directly related real-time multi-tasking software engineering experience utilizing "C" or C++ in lieu of Bachelor's degree and three years experience. Background must include at least one year experience in the following: year experience in the following: telecommunication software design and development, real-time mation applications in high level scripting tools, SQL and GUI development 40 hour work week development 40 hour work week. \$39.432 - \$59.148 per year. Apply at the Texas Workforce Commis-sion, Dallas. Texas or send resume to the Texas Workforce Commission, 1117 Trinity. Room 424T, Austin, Texas 78701, Job Order #TX7855787. Ad Paid by

an Equal Opportunity Employer

#### M.I.S. INTERNATIONAL'S

#### HOT ICE

FOR YEAR 2000 CONVERSIONS

AMAZES CLIENTS ACROSS THE COUNTRY

#### JOIN OUR HOT ICE TEAM!

Founded in 1971, M.I.S. International is one of the largest privately held information system and project management consulting firms in the U.S., and commands a reputation for industry excellence.

The Holistic Object-orienTed Integrated Conversion Environment is a proven set of re-hosting programs that expertly manage a broad range of conversion efforts. Modification of Hot Ice programs manage Year 2000 Compliance problems like a breeze. Hot Ice is even being used in several instances to do both functions simultaneously! With Hot Ice - the "Brute Force" and the Semiautomatic "Scanning" approaches are biting the dust. For More on Hot Ice, visit our web site at www.misint.com/hotice.htm.

We are currently experiencing exceptional growth, and our opportunities are by no means limited to Hot Ice conversions. For example, M.I.S. is an official ORACLE BUSINESS ALLIANCE PARTNER, and over 50 positions are available in the client server arena.

Your future Is our business, so step right up to a permanent position on our technical staff. Currently available opportunities include:

- COBOL Programmers, Legacy Systems
- DB2, IMS or CICS, COBOL/COBOL II
- ORACLE 7.0, SQL\*FORMS, DEVELOPER 2000, etc.
- VISUAL BASIC With OBDC
- C/C++, VISUAL C++, GUI DEVELOPMENT
- UNIX SYSTEM ADMIN.-HP/UX, SUN/OS or SGI
- WEB DESIGN, HTML/JAVA
- SYBASE, POWERBUILDER
- REAL TIME EMBEDDED SYSTEMS PROGRAMMERS

Call our Recruiting Department at (800) 860-3377, or forward your resume to M.I.S. International, Corporate Headquarters, 445 Enterprise Court, Bloomfield Hills, MI 48302; Email: admin02@misInt.com; Fax: (810) 253-9506. Equal Opportunity Employer



mainframe technologies to solve challenges for business and industry. In our progressive atmosphere, we focus on achieving client goals while providing satisfying careers for our associates. If you're interested in participating in the development, progres,s and process of the company as well as helping to move businesses ahead of tomorrow, here's your opportunity.

Opportunities in Y2K Practice in the following areas:

- Programmer Analysts
  COBOL, PL/1, CICS, SAS, DB/2, TELON, IDMS, IMS
- RDB Architect/Administrators
  CLIENT/SERVER CONVERSION
  ORACLE, SYBASE, INFORMIX, SQL SERVER
- Team Leaders/App. Developers C, C++, VB, PB, NT, SQL, OOAD, ORACLE, SYBASE, SQL SERVER
- Mgmt. Advisory Services
  IT/DW Architect Project Management

An employee-owned company, c.w. Costello & Associates, inc., provides you with the unparalleled freedom to pursue client satisfaction and participate in building and managing our company. Our Associates enjoy competitive salaries, outstanding benefits, formal and informal education and training, profit sharing, professional growth, and equity opportunities.

For Immediate consideration for one of our 12 national locations listed below, please send/fax your resume to: c.w. Costello, 100 Rosecommon Drive, Suite 108, Hartford, CT 06457. Fax: (860) 632-7325. Please indicate the location to which you are applying.



cue COSTELLO & ASSOCIATES, inc.

Hartford • Stratford • Boston • Providence • Columbus • Chicago • Tampa • Minneapolis • Albany • Milwaukee • Springfield • Nashua

Senior Computer Consultant (Chicago, IL): In developing business software applications use the following computer methodologies together on an IBM 3090 or ES9000 platform: QMF, MVS/ESA, COBOL, DB2, CICS, JCL, & INTERTEST. Additionally use the following computer methodologies together on an RS6000 system: UNIX, INFORMIX, C & TCP/IP. In formulating solutions for clients also use the following computer hardware and software: IBM PC, MVS/XA, MS DOS, VSAM, EXPEDITER, FILE AID, ADW, IBM PC COMPATIBLE, TSO/ISPF, CLIST, SMARTTEST, CSP, DATACOM-DB, DESIGN-1 & FOCUS, 40hrs/wk, 8:30am-5pm; \$58,000/Yr, Must have a Bachelor's in Computer Science or Engineering & 4 yrs exp in job offered or 4 yrs exp as Systems Analyst or Computer Consultant. Must have completed at least 3 business software development projects on an IBM 3090 or ES9000 using: QMF, MVS/ESA, COBOL, DB2, CICS, JCL, & INTERTEST. Must have completed at least 1 business software development project on an RS 6000 system using: UNIX, INFORMIX, C, & TCP/IP and at least 1 computer project using CSP & FOCUS. Must have proof of legal authority to work permanently in the U.S. Send resume/Itr in dupl to Illinois Dept of Employment Security, 401 South State St - 3 South, Chicago, IL 60605, Attn: Joan Sykstus, Ref# V-IL 15621-S. An employer paid at. No Calls.

Product Support/Electronic Engineer (Norcross GA) — Provide electronic engineering support to the service department. Specific duties include: Utilize acceptable soldering/desoldering skills; read and follow schematic diagrams and blueprints; repair power suppliers; perform all mandatory upgrades following the documented procedures; work without supervision on monochrome and color monitors; recognize all components color coding, making and identification symbols; complete repair paperwork as required; observe proper use of all test equipment and understand their functions; assist co-workers with troubleshooting when required; take over new product line or project held by other co-workers; cross reference parts by operating parameters to find suitable replacements. Require B.S. or equivalent in electronic technology or education technology plus one year experience in the job offered. Salary: \$862.00/wk. 8am-5pm. Send resume to Georgia Department of Labor, Job Order #GA 6049726, 1535 Atkinson Rd., Lawrenceville, GA 30243-5601, or Field Service Office.

http://careers.computerworld.com

http://careers.computerworld.com

# CorpTech Career Index: Information Technology



October

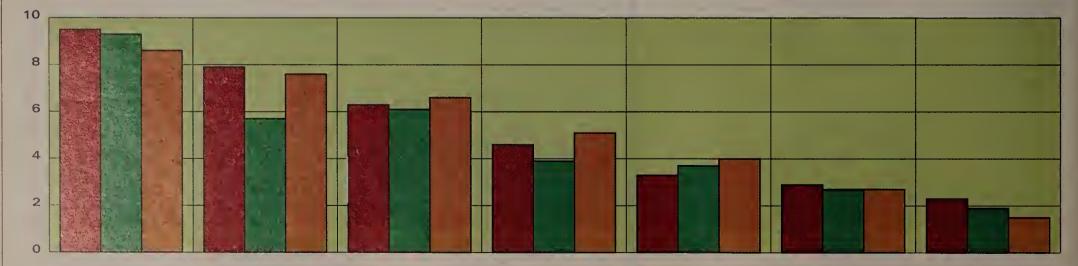


November



December

#### Percent change in number of employees by region



Computer Software

Computer Hardware

Telecommunications

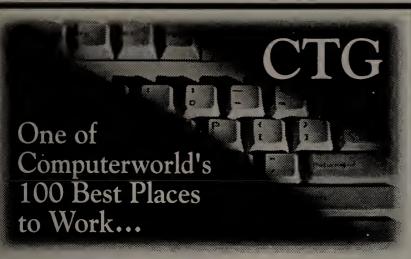
Lasers & Optics

Subassemblies & Components

Test & Measurement

Factory Automation

© Copyright 1996, Corporate Technology Information Services, Inc., Woburn, Mass.



CTG's inclusion in Computerworld's 100 Best Places to Work is testament to our commitment to our people. In addition to a progressive, flexible benefits plan, CTG consultants have the option of working with us on an hourly or salaried basis. With the majority of the Fortune 100 among our clients, we can offer more opportunities for professional development and

With over 50 offices throughout North America, CTG offers a wide range of opportunities for a wide range of skills. We have openings for people with the following background:

- APPLICATION DEVELOPMENT
- DATABASE ADMINISTRATION
- CLIENT/SERVER
- NETWORKING
- BUSINESS CONSULTING
- OPERATIONS
- SYSTEMS ADMINISTRATION
- DATA MODELING
- MAINFRAME/MID-RANGE/PC
- PROJECT MANAGEMENT
- HELP DESK/TECH SUPPORT
- INTERNET/INTRANET

For information on CTG's services or for immediate employment consideration, contact: CTG, 6700 Old Collamer Rd., East Syracuse, NY 13057. Phone: 800/272-5852. Fax: 800/586-5274. e-mail: david.trance@ctg.com An Equal Opportunity Employer M/F/D/V

www.ctg.com



PROGRAMMER ANALYST (2 applying knowledge of programming techniques & computer systems, evaluate user requests for new or modified programs to determine feasibility, cost & time reqid., compatibility with current system & computer capabilities. reg d., compatibility with current system & computer capabilities; consult with users to identify current operating procedures & clarify program objectives; formulate plan outlining steps regd. to develop program using struc-tured analysis & design; convert project specifications, using flowcharts & diagrams into sequence of detailed instruc-tions & logical steps for coding into language processable by sequence of detailed listifuctions & logical steps for coding into language processable by computer; apply knowledge of computer programming techniques & computer language; analysis, system design, development, programming & documentation for conversion system & technical support for the existing system; analyzing & providing solutions to production problems, system testing & using each of the following: Unisys A-Series, COBOL, WFL, DMS II, ERGO, CANDE, TADS, MS WORD, MS EXCEL & VISIO, Regs: Bachelor's in Computer Science, Systems Analysis, Computer Information Systems, Computer Engg., Electrical Engg., Electrical Engg., Electrical Engg., Electrical Engg., Electrical Engg., Especifical En yrs. exp. in a related occup. such as Programmer, Programmer Analyst, Systems Analyst, Senior Analyst/Programmer, Software Engineer or Consultant. Will accept 3 yrs. of college ed. plus 3 yrs. exp. in the job offered or in a related occup. in lieu of the req'd. ed. & exp. Must have some related exp. which includes analyzing & providing solutions to production problems & using each of the following: Unisys A-Series, COBOL, WFL, DMS II & ERGO. \$46,000/yr, 40 hrs/wk, 8a-5p. Send resumes to hrs/wk, 8a-5p. Send resumes to 7310 Woodward Ave., Rm. 415, Detroit, MI 48202 & include Ref.#: 136596. Employer Paid Ad.

Computer Programmer Analyst: Plans, develops, tests and docu-ments computer programs for ments computer programs for company internal control purposes. Analyze company internal computer control systems for effectiveness and efficiency. Redesign and modify purchased computer software programs using C++ computer language to using C++ computer language to improve said company computer internat control systems in: purchasing, accounting, warehousing, distribution, and customer returned merchandise controls. Prepare manuals and flow charts to explain modified software and their proper use. Train company personnel in use of modified software. Troubleshoot and debug modified software. 40 hour work week: 8 am to 4 pm. Salary: \$37,550 per yr. Requires Master degree in Comp. Sc. or Info Sc. & 6 mos experience in job offered or 6 mos as Statistical Marketing Analyst.: Education to include one college course each in: Computer Graphics and Advanced Data Structures. Education or experience to include the use of C++computer language. Experience ence to include the use of C++
computer language. Experience
to include developing & testing
computer software. Must have
proof of legal authority to work
permanently in the U.S. Contact
Benjamin L. Liu, Exec. V.P., Equus
Comp. Eystms., Ld. 1025
Lombard Dr., Lombard, IL 60148,
630/889-1020, Ext. 204

Application Developer II, 40 hrs/wk, 9am-5pm, \$36,725/yr. Software development, enhancement & programming for market research. Analysis of production problems. Development of test plans as well as system & unit problems. testing. Tools: IBM/MVS, DOS, WINDOWS, UNIX, C/C++, PL/1, JCL, X-Windows, Gul. Bachelors yr experience in job offered or as a Programmer/Application Developer required Prior experience must include. IBM/MVS, DOS, WINDOWS, UNIX, C/C++, PL/1, JCL, X-Windows, GUI. Must have proof of legal authority to work permanently in the U.S. Send two copies of both resume and cover letter to: ILLINOIS DEPART-MENT OF EMPLOYMENT SEC-URITY, 401 South State Street 3 South, Chicago, tL 60605. Attention: Dennis Jones, Reference #V-IL-16057-D NO CALLS An Employer Paid Ad.



The forecast is stormy! January 1st, 2000 could be disasterous for businesses near and far. As the century turns, systems requiring date calculations will fail by either terminating abnormally or by producing incorrect results as computers are unable to recognize the new digits.

There's no time

like the

#### **PRESENT**

to navigate the

FUTURE.

Who is gauging and weathering this storm?

#### CAP GEMINI America.

Cap Gemini's TransMillennium™ Services provides a solution that is a comprehensive multi-phase application renovation process that navigates clients smoothly from initial assessment through triage/strategy, renovation and final validation and implementation. CAP GEMINI America is proud of our ITAA 2000

For I.T. professionals inspired by challenge, CAP GEMINI has an opportunity for you to guide business into safer harbors.

We have immediate opportunities available for Technical Solution Architects with extensive mainframe technology expertise (min. 10 yrs exp). Prior consulting experience is an added bonus! Travel flexibility throughout the United States is a mandatory requirement.

For more information about our exceptional career opportunities, ongoing training programs and impressive compensation package, please fax resume to (972) 490-6823. Or mail it to: R. Shapard, CAP GEMINI, 13455 Noel Road, Suite 1600, Dallas, TX 75240 E-mail: rshapard@capgemini.com An Equal Opportunity Employer.



#### **Software Support Analyst**

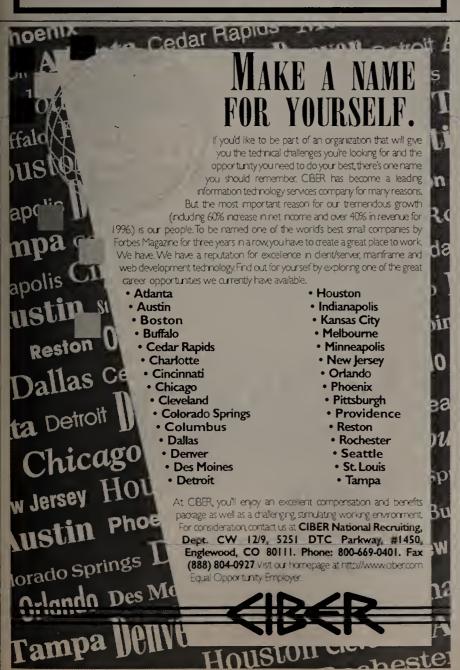
Sterling Software is one of the worlds leading Independent Software Vendors. Our Storage Management Division based in Sacramento, CA, is a pre-eminent supplier of storage manage ment software solutions, and is currently seeking an energetic professional with a minimum of 3 years responsible experience in mainframe storage management. The position requires the analyst to perform a variety of analytical and technical tasks in the resolution of customer inquiries and software product problems. If you possess the following qualifications and enjoy an interesting and challenging position, we would like to talk to you.

- Extensive knowledge of Sterling's Storage Management Division product line, specifically SAMS:Disk (DMS/OS) and SAMS:Allocate
- Detailed knowledge and related experience of concepts, architecture and hardware technology used in the implementation of storage management.
- Knowledge of IBM operating systems, job control language and util hes, VSAM, DFSMS and DFHSM.
- Ability to seek resources, assume responsibility for resolving customer needs and respond rapidly to changes in technology or new requirements in assignments.

fantastic career opportunity with a multi-national company. In addition, Sacraniento provides a great living environment, with the sounds of San Francisco and the sights of Lake Tilhoe ji St

Please send your resume to Sterling Software, Storage Management Division. 11050 White Rock Rd., Suite #100, Rancho Cordova, CA 95670-6095, attn.: Cindy Jeter. EEO/Affirmative Action Employer.





# Find Training now.

careeragent.computerworld.com



New from:

COMPUTERWORLD





### A Better View of Your World.™

EMi, an international systems integration and software consulting firm is currently seeking systems architects, project managers, analysts, software engineers, and systems developers with expert experience in the newest Client/Server and Mainframe technologies. Currently we are in need of associates with expertise in the following areas:

#### .SAP

- .Basis
- .Project Managers
- .Functional Consultants
- .ABAP/4 Developers & Team Leaders **PeopleSoft**
- Baan
- Oracle
- Year 2000 Conversions
- .EDI/EC Experts
- .Java
- .HTML

#### Contact

EMi has offices in Pittsburgh, Cincinnati and Atlanta. We are a 28-year-old firm with a long track record of success. If you are interested in joining one of the fastest growing consulting firms in the country please send or fax your confidential resume.

1789 South Braddock Avenue. Suite 220.

Pittsburgh. PA. 15218

412. 243. 4600 voice 412. 243. 4830 fax

http://seek-consulting.com



- Windows 95/NT, VC++, MFC, OLE
- Windows NT Device Driver Developers Powerbuilder 5, OO Development
- · Oracle, Sybase, Informix DBAs
- Oracle Financials (AP, AR, GL, OE)
- Data Warehousing
- · PeopleSoft HRMS, Financials, Manufacturing
- C/C++, UNIX, X.25
- Object Oriented Developers, C++, Smalltalk
- UNIX System Administrators (HP-UX, equent)
- Tuxedo Developers/Administrators
- BIOS Developers
- C, Assembly, Real Time Multitasking OS
- GSM, TDMA, CDMA, FHMA, CDPD

A sampling of consultant opportunities nationwide: Are you a Consultant looking for an exciting opportunity? SEEK the technical staffing firm with the inside track -SEEK Consulting. We are connected to today's hottest companies and maintain direct communications that make our clients' latest technical challenge your next

> SEEK the Inside Advantage by sending your resume to: **SEEK Consulting** Group, Inc., Attn: Dept. CW, 401 Edgewater Place, Suite 130, Wakefield, MA 01880. Phone: (800) 274-1174 FAX: (888) 777-SEEK (7335) E-mail: jobs@seek-consulting.com

We are an equal opportunity employer.



FIVE OPENINGS FOR SENIOR SOFTWARE ENGINEER Develop and implement designs, hierarchies, memos and table forms utilizing advanced knowledge of software engineering concepts. Determine, recommend and plan the layout of computer and peripheral equipment to be installed or to modify existing equipment, utilizing knowledge of programming languages. Work on complex designs and coding sys-tems, analyze software require-ments to determine feasibility of design within time and cost con-straints and formulate and design software systems using scientilic analysis and mathematical mod analysis and mathematical mod-els to predict and measure out-comes and consequences of design. Develop and direct soft-ware system testing procedures, programming and documenta-tion, in addition to consulting with customers concerning mainte-nance of software systems. Plan and prepare technical reports, memoranda and instructional memoranda and instructional of the program in the system. Requires a Bachelor's degree in Computer Science or Electrical Engineering or Computer Engineering and three years experience in job offered or three years related computer software years analysis experience. systems analysis experience. Background must include at least background must include at least two years experience in software projects using RDBMS and INFORMIX on UNIX platforms. 75% travel is required to various unanticipated locations through-out the United States. 40 hour work week. \$50,000 - \$75,000 per year. Apply at the Texas Workforce Commission, Dallas, Texas or send resume to the Texas Workforce Commission, 1117 Trinity, Room 424T, Austin, Texas 78701, Job Order #TX7856390. Ad Paid by an Equal Opportunity Employer.

#### SENIOR CONSULTANT

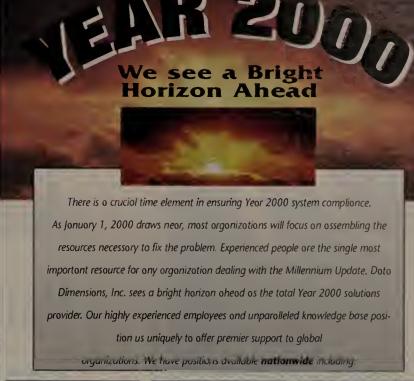
Legato is the market leader in network storage management products for heterogeneous client/sever computing envi-ronments. We have excellent opportunities for experienced open systems consulting pro-essionals across the country. Responsible for developing requirements, designing, mplementing and customizing Legato storage manage-ment solutions in customers' distributed, open systems environments. We are looking for self-directed individuals to assist us in building our professional services offerings. Requires strong account mgmt. in large customer environ.; 7+ yrs. exp. with UNIX, NT, plus familiarity with SUN, HP, IBM platforms; knowledge of storage, systems, operations and performance ngmt. and relational databases. BSCS a plus, Must be willing to travel at least 50%.

egato Systems, Inc., 3145 Porter Drive, Palo Alto, CA 94304; fax to (415) 812-6032; e-mail (text only) to jobs@legato.com. Visit our veb page at www.legato.com



LEGATO

Consultant. Design, develop & implement software applications for business clients. Design & development of databases design. Databases including data modeling. GUI design. Database and UNIX system administration. Tools: SQL\*Forms; SQL\*Reportwriter; SQL\*Menu: Qracle & related CASE Tools; client/server systems; Informix; ESQL; C; 4GL; PowerBuilder, UNIX. M.S. in PowerBuilder, UNIX. M.S. in Computer Science or Electrical Engineering as well as 1 yr exp. in job offered or as Application Developer required. Previous exp. must include: Informix, ESQL; 4GL. 40 hrs/wk, 9am-5pm, \$50,000/yr. Must have proof of legal authority to work permanently in the U.S. Send resume to: Cathy Sutton, Whittman-Hart, Inc., 311 S. Wacker Drive, Ste. 3500, Chicago, IL 60606. (312) 922-9200.



#### **Senior Consultants**

Candidates should have a working knowledge of PC's and mainframe environments. Strong analysis skills, design and testing background. Experience in COBOL, Assembler, DB2 and other languages. Strong time and project management skills along with good

communication

skills needed.

#### **Principal Consultants**

Candidates will possess ability to manage large scale projects from planning to implementation. Solid communications skills and experience with mainframe and PC applications needed.

#### Programmers/ Analysts

Candidates will need experience in an IBM mainframe environment with COBOL, CICS, ICL and IBM utilities. Strong time management skills and good communication skills needed.



#### Data **DIMENSIONS**

Please send or fax resume to. Data Dimensions, Inc., 777 108th Avenue #2070, Bellevue, WA 98004 Fax: (206) 688-1099 Email: 72731,1702@compuserve.com We are an Equal Opportunity Employer

#### YEAR 2000 CONVERSION PROFESSIONALS **NEEDED IMMEDIATELY!!** For Projects in the US and Internationally

Join the industry's leader in Information Technology Services. Since establishment in 1986, Mastech has made its mission reality by providing fast response times, competitive rates, and the ability to place software engineers at project sites anywhere in the world Mastech has been recognized by Inc. magazine as one of the fastest-growing companies four times. Our client base spans over 300 companies including Bechtel, Oracle Corp, IBM, Intel, Ernst & Young, and Charles Schwab & Co. rely on our expertise to achieve their goals. Mastech has launched an ambitious expansion program involving new international operations, wider service offerings and Year 2000 Solutions.

We require Year 2000 professionals for Projects in Chicago, Dallas, Philadelphia, and Detroit:

**IBM Mainframe** MVS DB<sub>2</sub> COBOL PL/1 IMS CICS Assembler IDMS

If you are up to the challenge, send your resume to

**Mastech Corporation** Winn Van Brimer

1004 McKee Road Oakdale, PA 15071

ISTECH

Fax: (412) 787-7450 E-mail: Winn@Mastech.com



June 8-11, 1997
Marriott Rivercenter Hotel
San Antonio, Texas

# Reserve your place at the hottest conference of the year.

Call 1-800-488-9204 for info

# This Web site

e-mails
you with the
career opportunities
you want.



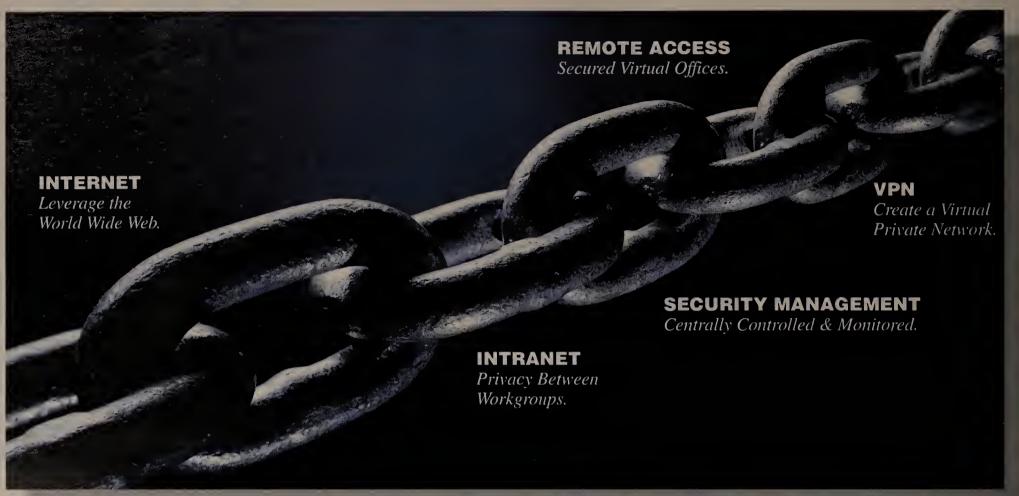
Register today and USE CAREERMAIL

http://careers.computerworld.com

itCareers.

Where the careers find you.

# No missing links with Cylink Total Network Security solutions.



lotal Network Security is more than a firewall. And when you manage an enterprise with several types of networks, the security system you have for one may be insufficient for another. You need a security solution that is designed to manage every type of network.

Cylink understands your business and security needs. Since 1984, we've enabled the largest banks, brokerage firms, pharmaceutical companies and multinational corporations to



Cylink's family of security products allows you to implement the five elements of a corporate network, shown above

applications, or network performance. Our reliable technical service team makes it happen.

realize the benefits of the latest networking technologies by allowing them to distribute information securely over any type of network. Our combined hardware and software solutions are transparent, having no impact on users,

#### Imagine the possibilities a secure network can deliver:

- Access ATM, Frame Relay, TCP/IP, X.25, and other technologies
- Enable customers to investigate your products and services electronically
- Allow external personnel to exchange on-line information with the home office
- Share discreet technologies with strategic partners
- Create a more efficient network

We understand your business and security needs. Let us create a comprehensive security solution for your network. Call today or visit our web site.



World Leader in Enterprise Security Solutions and Wireless Communications

Cylink offers sales and service through a worldwide network of direct sales and business partners.

910 Hermosa Court, Sunnyvale, CA 94086 • Tel: (408) 735-5800 • Fax: (408) 720-8294 • Fax on Demand: (USA) 800-735-6614 (#290) (Int'l) 408-735-6614 (#290) • E-mail: Info@cylink.com http://www.cylink.com Cylink U.K. Tel: +44-1256-841919 • Fax: +44-1256-24156 • Cylink Singapore Tel: 65-297-6196 Fax: 65-297-6195

# Marketplace ECHNOLOGY WATCH

PRINTERS, COPIERS AND

#### MULTIFUNCTION MACHINES By Amy Malloy GET SERIOUS he multifunction market is MFP service. The corporate enthe victim of poor nomen-

clature and misconception, but, according to analysts, users are taking an interest in that market and setting it on an upward path.

So what is a multifunction machine? It's a product that performs at least two of the following functions: copying, scanning, printing or faxing. As for the name, the machines have been referred to as multifunction products, hydras, multifunction printers and multifunction peripherals, to list a few.

Analyst projections indicate that the multifunction product (MFP) market will have greater growth than its single-function competitor. It will grow 60% vs. about 1% growth for the single-function market by the year 2000, projects Barry Tepper, a senior consultant at CAP Ventures, Inc., a Marshfield, Mass.-based market research firm and consultancy that focuses on the document imaging market.

That market is divided into three categories: the high-end production products, such as those used at data centers, that require a trained operator and cost up to \$270,000; the low-end personal products; and, in the middle, workgroup products for general office use, says Andrew Johnson, senior industry analyst in charge of Dataquest's new facsimile and vironment is not limited to use of the high-end or even

the workgroup products. Bureau or telecommuting employees reap benefits from access to an MFP, which, in turn, saves the company from spending extra dollars to buy three or four separate products. Analysts say that some companies even provide office employees with individual units for convenience reasons.

For instance, an executive and an assis-

tant might require privacy with regard to faxes sent and received, as well as printouts. The "credenza market" is what Tepper calls that particular niche, aptly named after the section of the office where such a machine might reside.

The workgroup portion of the market is divided between fax-based and copierbased machines. Typically, both types of machines offer printing capability as the additional function. Other functions may also be available, but copying and faxing tend to be the two primary functions, according to Johnson.

Those products are generally more robust in one area, but some products do perform two functions equally well, according to Tepper. However, because of the lack of consumer knowledge about that market, those selling the products generally group them into one of the single-function areas, Tepper says.

This type of limited performance is a hindrance to the larger office environment. "These products currently emphasize one function over another. When you move into the corporate setting, these compromised functions are not acceptable," says Keith Kmetz, a research manager at International Data Corp. in Framingham, Mass.

But analysts predict the MFP's integration of functions will improve. "The copier vendors in 1997 are better prepared to deal with supporting the printing functions on the digital copier," Johnson says.

According to analysts, another part of the reason for the slow acceptance is cost. Copier-based MFPs are digital machines that previously cost 30% to 40% more than the typical analog copier, according to Johnson.

Now, however, digital machines cost only about 10% more than analog machines, he says.

"My bet is that 1997 will be the year for [the workgroup] segment. It has been the laggard of the three segments because of lack of product and a premier price for those products," Johnson says.

Last year, only 3% of total sales of products that scan, fax, print or copy were multifunction products that perform two or more of these functions. By the year 2000, Tepper predicts that 22% of all sales in this market will be from multifunction machines.

Malloy is Computerworld's assistant researcher.

#### Multifunction segments Estimated vendor rankings for 1996 **ENVIRONMENT** COMPANY RANK Production Canon Xerox 2 Kodak 3 Ricoh 4 Workgroup HP Ricoh Sharp Canon Personal HP Canon 2 Brother

Xerox

SOURCE: CAP VENTURES, INC

# **COMPUTERWORLD Marketplace** vendor center

## (800) 447-0018

Software
3780 RJE Emulation ext. 517
Client/Server
Development Tools ext. 509
Duplication Software ext. 521
Groupware ext. 511  Network Management ext. 512
PC-to-flost Connectivity ext. 520
Remote Access ext. 513
Securityext. 516
Terminal Emulation ext. 518
Utilities/Antivirusext. 502
Year 2000 ext. 519

Computers/Peripherals	
Back-up/Tape/Disk ext. 216	
Desktop PCs ext. 201	
Furnitureext. 220	ı
Kiosks ext. 217	1
Mainframesext. 215	ı
Midrange ext. 219	,
Presentation/ Projectors/Panels ext. 205	
Repairs and Maintenance ext. 221	
Security ext. 218	ı
Servers ext. 214	
Sparc Microprocessors ext. 222	
Storage/RAID/	
DAT/Öptical ext. 209	
Tapes/Disk Drives ext. 207	
Workstations ext. 203	

Methol king/ communications
Client/Server Tools ext. 60;
Diagnostic/Testing
Equipment ext. 629
Ethernet ext. 623
Groupware ext. 606
Hubs ext. 628
Internet Products/Services ext. 63-
Network Hardware ext. 619
Network Management ext. 607
Network Softwareext. 618
Networking/Communications
TCP/IP Applications ext. 620
Remote Access ext. 608
Security em. 632
Storage/Cabinets/LAN Racks ext. 619
Switches/Gateways/
Bridges/Routers ext. 613
Windows NT ext. 617

261 Aire2	÷
Consulting/Contract	
Programming ext. 79	<i>U</i> 3
Conversions ext. 7	07
Data Recovery ext. 7	80
Outsourcing/Remote Computingext. 7	06
Training/ Software Supportext. 7	04
Year 2000 ext. 7	10

Internet/Intranet
Application Development Tools ext. 330
Browsersext. 305
Consultingext. 308
E-Mail Gateway ext. 311
Encryption ext. 312
Firewalls ext. 314
Security ext. 322

A FREE SERVICE for our readers that's as easy as...

 Call the Computerworld Marketplace Vendor Center at (800) 447-0018.

2 Ask for the extension listed in the product area you want information on.

Sit back and relax - your requested information is on the way.

Get detailed product information direct from a variety of manufacturers.



#### Why Buy Boxlight

- Over 50 models in stock
- Knowledgeable sales people
- Projectors from \$2,999
- Panels starting at \$1,499
- FREE Lifetime technical support
- 30-day money back guarantee
- 11 years of experience and

http://www.boxlight.com



PRESENTING A BETTER WAY TM

#### EVOLUTION

800x600 SVGA Power Zoom Focus Video Capable

500 ANSI Lumens Wireless PC Mouse PC and Mac Compatible

#### Call Today and We Will Have You **Looking Good Tomorrow**

Looking for a quick way to improve your image? Our new Revolution 3600 projector is the lightest, brightest high-resolution



Government: (800) 497 4009

International: (360) 779 7901

Fax: (360) 779 3299 Resellers: (800) 736 6956

Rental: (800) 736 6954

Education: (800) 689 6676

projector you can get. We can even set you up with a rental or arrange a low-cost lease. Is 10am tomorrow soon enough?

CALL 1-800-762-5757 TODAY!

Prices subject to change. Quantities may be limited to stock on hand.

Look Bright Overnight!











\*30-day money back guarantee does not apply to Resellers.

# **Operating your PC** up to 300 Feet Away is a SNAP!

- Locate your keyboard, monitor and PS/2 mouse up to 300 feet away from your computer
- Now uses two Category 5 UTP cables for lower installation cost
- Works with PC, PC/XT, PC/AT, PS/2 and 100% compatibles
- **Supports up to 1024 x 768** non-interlaced resolution
- Keep your PC in a secure, climate-controlled area and maintain access from crowded or harsh environments



4912 Research Drive Huntsville, AL 35805 USA 1-800-932-9239 (205) 430-4030 fax http://www.cybex.com/





edistrogram Available

Made in USA

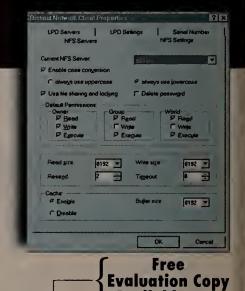
# Distinct NFS 95™

Easiest way to Share Files, Programs and Printers



#### Highlights:

- Integrates seamlessly into Windows 95
- Mounts NFS drives from Explorer or **Network Neighborhood**
- Supports file and record locking
- Allows central authentication with a single server running PCNFSD for all NFS connectivity
- Prints to NFS or LPD print servers
- Allows login to all systems with a single login name and password or different login names for each system
- Allows single-operation logout of all systems accessed through Network Neighborhood
- Fine tunes performance parameters for each server you access!





cworld@distinct.com Fastfacts: 408.366.2101

TO ADVERTISE, Call toll free: 1-800-343-6474 Ext. 7744

"Where IS Buyers Find Solutions"

# **COMPUTERWORLD Marketplace**

**COMPUTER RACKS** 

## Looking For The BEST Company To Give You The BEST Value In IBM Computer Hardware?

#### We're IBM Experts:

- •RS/6000
- •ES/9000
- · AS/400
- Series/1
- PCs
- Networks & Integration

#### Sales & Rentals

- ✓ Processors
- ✓ Peripherals
- ✓ Upgrades
- ✓ New
- Reconditioned With warranty



http://www.dempseybus.com e-mail: dempsybus@dempseybus.com



Buy • Sell • Rent (800) 888-2000





# Your ad could be here... POTENTIAL BUYERS

Call today to place your ad (800) 343-6474, ext. 7744 \*Intelliquest CIMS v3.0, 1996. Average Issue Audience

# STANDARD PARTS CUSTOM-TAILORED SPACE SAVING EASY SET UP TEL: (212) 684-4666 CAP C FAX: (212) 684-6853 Call 1-800-434-3746 C HERGO. Ergonomic Support Systems, Inc.

# ALICOMP

Has a SMALL BUSINESS DIVISION which has serviced over 175 diverse clients. It specializes in praviding VM, MVS, VSE service to clients who need:

**•OUTSOURCING (Up to 10 MIPS) •REMOTE COMPUTING** 

•YEAR 2000: Mainframe Conversion Test Environment **•TAPE CONVERSIONS** 

**•SYSTEMS INTEGRATION CONSULTING** 

Industry

•Financial Services •Non Profit •Software Developers •Healthcare •Manufacturing/Distributing •Publishing

We are the "Boutique" of the Computer Services World

Serving Clients since 1980

(201) 319-8787 • (800) 274-5556

## **DATA RECOVERY: 800 440-1904**

#### Seven good reasons to choose DriveSavers:

- 1. We're the most trusted and respected Data Recovery Specialists
- 2. We offer 24-hour, onsite, and weekend service
- 3. We've developed proprietary techniques so advanced we can retrieve data others
- **4.** We're certified by most major drive manufacturers to maintain drive warranties
- 5. We've been restoring data-and peace of mind-since 1985
- **6.** Our amazing data recovery success stories have been featured in dozens of magazines and newspapers from *Forbes* and *USA Today* to *The Los Angeles Times*, and television shows such as CNN, ClNet, NextStep, and MS/NBC
- 7. We specialize in all storage devices; DOS, Win95, WinNT, OS/2. Mac OS, UNIX,

Call when you need us, or visit DriveSavers at: www.drivesavers.com

400 BEL MARIN KEYS BL., NOVATO, CA 94949, VOICE: 415-382-2880, FAX: 415-883-6788



SALES UP! **RESPONSE UP!** 

**SEE WHAT CLASSIFIED SOLUTIONS SECTION CAN DO FOR YOU!** 

Call today to place your ad! Christine Tenneson 800-343-6474 ext. 7744

**COMPUTERWORLD** MarketPlace

Classified Solutions

**EXPENSES** DOWN!

#### **DISTRIBUTOR WANTED**

MVS-Application to change DSNs in ICL and catalog (including VSAM, IMS, etc.) Restruct of JCL according to SMS-rules, symbols and OPC supported, DB2based, 15 installations in Germany

opus Landsberg, Germany Fax +49-8191-942046

#### Invitation for Sealed Bids - Materials Management Department

Sealed Bid Cap 46-96 will be received on Monday, December 30, 1996, between 9:00 a.m. and 4:00 p.m. EST/EDST, in Room 2810, Materials Management Department, Massachusetts Bay Transportation Authority, Ten Park Plaza, Boston, Massachusetts 02116, for the material listed below:

#### **PARATRANSIT COMPUTER SYSTEM** IN ACCORDANCE WITH MBTA SPECIFICATIONS

A Pre-Bid Conference will be held at 10:00 a.m. on Tuesday, December 10, 1996, at the Materials Management Dept. Conference Room. Bidders planning to attend are requested to notify Mr. Victor H. Wong, Buyer, at telephone number (617) 222-5996. The Contractor will be required to comply with all applicable Equal Opportunity Laws and Regulations, DBE/WBE Laws and Regulations, and Buy America requirements. All Bidders will be required to certify that they are not on the Comptroller General's List of Ineligible Contractors.

Invitations for Bid and other pertinent information and specifications may be obtained at the Materials Management Department, Room 2810, Ten Park Plaza, Boston, Massachusetts 02116-3974.

◆ Software Develop ent

M&M Data Systems, LLC





**OFFSHORE** SOFTWARE DEVELOPMENT

Windows, C++, Delphi

WWW.MMDATA.CO (40) 869-9236

#### 120

#### COMPUTERWORLD, INC.

CEO/ President Gary J. Beach

Senior Vice President/ Finance Matthew C. Smith

Susan C. Perry

**Executive Assistant** to the CEO/President Karen E. Elliott

#### COMPUTERWORLD

An IDG Company: The World's Leader in Information Services on Information Technology

Executive Vice President/Publisher
Michael R. Rogers
Computerworld Headquarters: 500 Old Connecticut Path, P.O. Box 9171, Framingham, MA 01701-9171
Phone: 508-879-0700, FAX: 508-875-4394

Paul Gillin

Vice-President **Bob Winter** 

Vice-President Consumer Marketing Gail Odeneal

PUBLISHER'S OFFICE: Assistant to the Publisher/Laureen Austermann MARKETING: Director, Marketing Communications/Mary Doyle, Senior Manager, Marketing Communications/Elizabeth Phillips, Manager, Trade Show & Conventions/Audrey Abbott, Marketing Manager/Susan Thaxter, Marketing Communications Project Manager/Karen Lesko, Marketing Specialist/Emily Dinneen, Administrative Assistant/Patty White CIRCULATION: Director of Circulation Management/Maureen Burke PRODUCTION: Production Director/Christopher P. Cuoco, Production Manager/Beverly Wolff SALES CLASSIFIED: Classified Operations Director/Cynthia Delany DISTRIBUTION: Distribution Manager/Bob Wescott, Traffic Manager/Pat Walker INFORMATION SYSTEMS: Vice-President of IS/Walter Crosby

#### SALES OFFICES

Computerworld Headquarters: 500 Old Connecticut Path, P.O. Box 9171 Framingham, MA 01701-9171 Phone: 508-879-0700, FAX: 508-879-0446

#### NORTHEAST

Regional Vice President: Sherry Driscoll, Senior District Manager: John Watts, District Managers: Isabelle Kane, Laurie Marinone, Sales Office Coordinator: Tarmmy Boisvert, Sales Assistants: Cheryl Stratton, Diane McNeil, 470 Totten Pond Rd., 5th Floor, Waltham, MA 02154 (508) 879-0700 FAX: (617) 890-2669 Hearing Impaired: (800) 428-8244

Regional Vice President: James Hussey, Senior District Managers: Fred LoSapio, Victoria Gonin, Mike Bachman, Barry Cheney, Senior Account Executive: John Bosso, Sales Assistants: Susan Kusnic, Jean Dellarobba, John Radzniak, Mack Center 1, 365 West Passaic St., Rochelle Park, NJ 07662 (201) 587-0090 FAX: (201) 712-9786 Hearing Impaired: (800) 208-0288

#### SOUTH-ATLANTIC

Regional Vice President: Bernie Hockswender, Sales Assistant: Jennifer Pattenaude, 1565 Woodington Circle, Suite 201, Lawrenceville, GA 30244 (770) 931-8104 FAX: (770) 931-8106 Hearing Impaired: (800) 449-4974, Senior District Manager: Mike Bachman, Sales Assistant: Mary Cavaliere, 175 Strafford Ave. #1, Wayne, PA 19087, (610) 975-4581 FAX: (610) 975-4582

Senior District Manager: Sharon R. O'Brien, Account Executive Laurie Gomes, Sales Assistant: Denice Richards, 875 N. Michigan Avenue, Suite 2846, Chicago, IL 60611 (312) 943-4266 FAX: (312) 943-2214

#### SOUTHWEST

Sales Assistant: Brenda Shipman, 14651 Dallas Parkway, Suite 304, Dallas, TX 75240 (972) 233-0882 FAX: (972) 701-9008 Hearing Impaired: (800) 822-4918

#### CUSTOM PUBLICATIONS

Boston: Director of Publishing Services/Carolyn Medeiros, Project Coordinator/Heidi Broadley, Managing Editor/Peter Bochner, Graphic Designer/Gail Varney, 500 Old Connecticut Path, Box 9171, Framingham, MA 01701-9171 (508) 879-0700 FAX: (508) 875-6310

San Francisco: West Coast Director/Elaine R. Offenbach, Sales Associate/Nikki Wilson, 500 Airport Boulevard, Suite 400, Burlingame, CA 94010 (415) 347-0555 FAX: (415) 347-8312

#### COMPUTERWORLD JOURNALS

Director: James Hussey, 500 Old Connecticut Path, Box 9171, Framingham, MA 01701-9171 (508) 879-0700 FAX: (508) 872-

Manager: Don Calamaro, 1856 Windsor Park Lane, Havertown, PA. 19083 (610) 446-5372 FAX: (610) 446-5753 Display Advertising Coordinator: Peggy Hennessey, 500 Old Connecticut Path, Box 9171, Framingham, MA 01701-9171 (508) 879-0700 FAX: (508) 879-0446

#### MARKETPLACE ADVERTISING

Sales Manager/Michelle Reeves, Sales Assistant/Christine Tenneson, Central/Southeast Account Executive/Ann Meleney, 500 Old Connecticut Path, Framingham, MA 01701-9171 (800) 343-6474 FAX: (508) 820-0941

Western Account Executive/Claude Garbarino, 500 Airport Blvd., Suite 400, Burlingame, CA 94010 (415) 548-5544 FAX: (415) 343-5023

#### SOMPUTERWORLD INFORMATION MANAGEMENT DIVISION

Vice President/General Manager: Richard Mikita, Vice President: John Carpenter.

Computerworld VAR Database: Carol Mullen/ National Sales Manager, Account Executive/Sean Weglage, (508) 879-0700 FAX. (508) 879-0184

Computerworld Buyers Database East: Regional Manager, Database Services/Linda Clinton, (508) 879-0700 FAX: (508) 879-0184

Computerworld Buyers Database West: (415) 347-0555 FAX



#### NORTHERN CALIFORNIA

Vice-President Western Advertising Sales: Richard Espinoza, Senior District Managers: Ernie Chamberlain, Linda Holbrook-Dusay, Christine Curry, District Managers: Lisa Kowalski, Denyce Kehoe, HR Representative: Leticia Lehane, Operations Manager: Denise Hui, Account Executives: Shannon Dempsey, Andrea Zurek, Gena Haas, Sales Associates: Tamara Haney, Emmie Hung, Amy Blechman, Todd Herrold, Marcy Walpert, Nina Pukonen, Office Services: Jessica Abude, Sales Coordinators: Yvonne Zuniga, 500 Airport Boulevard, Suite 400, Burlingame, CA 94010 (415) 347-0555 FAX: (415) 347-8312 Hearing Impaired: (800) 900-3179

#### SOUTHERN CALIFORNIA

District Manager. Nancy Coy-Bianchi, Account Executive: Susan Davis, Sales Associate: Pat Duhl, 2171 Campus Drive, Suite 100, Irvine, CA 92612 (714) 250-3942 FAX: (714) 476-8724

#### ADVERTISING OPERATIONS

Display Advertising Production Manager: Paula Wright, Display Advertising Coordinators: Lisa Tanner, Gregg Pinsky, (508)-879-0700 FAX: (508) 879-0446

#### RECRUITMENT ADVERTISING SALES OFFICES

Vice President/Recruitment Advertising/John Corrigan Marketing Director/Derek E. Hulitzky, 500 Old Connec Path, Framingham, MA 01701-9171 (800) 343-6474

New England & Upstate New York: Regional Manager/Nancy Percival, 470 Totten Pond Rd., 5th Floor, Waltham, MA 02154 (800) 343-6474, Account Executive/Nancy Mack, (800) 343-6474

Mid-Atlantic: Regional Manager/Marty Finn, Mack Center 1, 365 West Passaic St., Rochelle Park, NJ 07662 (201) 587-0090, Account Executive/Caryn Dlott, (800) 343-6474 TDD: (800) 208-0288

South-Atlantic: Regional Manager/Katie Kress-Taplett, 8304 Professional Hill Drive, Fairfax, VA 22031 (703) 573-4115, Sales Manager/Pauline Smith (800) 343-6474 Midwest: Regional Manager/Pat Powers, 1011 East Touhy Avenue, Suite 550, Des Plaines, IL 60018 (847) 827-4433, Account Executive/Nick Burke (800) 343-6474 TDD: (800) 227-

Southwest: Regional Manager/Ellen Cross, 14651 Dallas Parkway, Ste. 304, Dallas, TX 75240 (972) 726-7485, Account Executive/Jim Parker, (800) 343-6474

Northwest: Regional Manager/Christopher Glenn, 246 Casitas Ave., San Francisco, CA 94127 (415) 665-2443, Account Executive/Fabiola Franz, (800) 343-6474

West: Regional Manager/Barbara Murphy, 2171 Campus Drive, SIe. 100, Irvine, CA 92715 (714) 250-0164, Account Executive/Jeff Yoke (800) 343-6474 TDD: (800) 203-5867 Internet Careers Site: Jay Savell, Account Executive, 500 Old Connecticut Path, Framingham, MA 01701-9171 (800) 343-6474

#### DIRECT RESPONSE CARDS

500 Old Connecticut Path, Framingham, MA 01701-9171 (800) 343-6474

National Accounts Director/Norma Tamburrino, Accoun Executive/Christine McGovern, Mack Center 1, 365 West Passaic St., Rochelle Park, NJ 07662 (201) 587-0090

Director/Elizabeth Cooper, Sales Associate/Nancy Dillon, 500 Airport Boulevard, Suite 400, Burlingame, CA 94010 (415) 347-0555 FAX: (415) 347-8312

#### INTERNATIONAL DATA GROUP

Chairman of the Board, Patrick J. McGovern, President, Kelly Conlin; Chief Operating Officer, Jim Casella

Computerworld is a publication of International Data Group, the world's largest publisher of computer-related information and the leading global provider of information services on information technology. International Data Group publishes over 275 computer publications in over 75 countries. Sixty million people read one or more International Data Group publications each month.

Acer America 65, 66 http://www.acer.com
Advanced Logic Research
Amdahl
BMC Software38-39 http://www.bmc.com
ComNet
Cayenne Software Inc
Compaq Computer
Corp
Computer Associates 5 http://www.cai.com
Compuware18-19 http://www.compuware.com
Data General
Digital Equipment Corp 11, 67, 69, 73 http://www.digital.com
ETS 40
Forté25 http://www.forte.com
FTP Software
IBM26-27, 90 http://www.ibm.com
Information Builders55, 57 http://www.ibi.com
Informix Software
Innovation Data Processing 9 http://www.innovationdp.fdr.com
Internet Commerce Expo 64
Kingston Technolgy
Lawson Software
Lotus Development Corp 30-31 http://www.lotus.com (800) 343-5414
Lucent Technologies
McAfee

ADVERTISERS INDEX

http://www.microfocus.com (800) 872-6265
Micron
Microsoft74-75 http://www.microsoft.com
NEC Technologies 42-43 http://www.nec.com
NetManage 56 http://www.netmanage.com
Nokia Display Products 49 http://www.nokia.intltech.com (800) BYNOKIA
Novell
Open Text Inc
Opin Systems
Oracle Corp
Platinum Software 122 http://www.platsoft.com
Powersoft
Sagent Technology17
SAP America
SAS Institute
SCO52 http://www.sco.com
Silicon Graphics Com
Sofbank
Sun Microsystems 21, 82 http://www.sun.com
Tech Corp24
Toshiba50-51 http://www.toshiba.com
Vayu Web 60-61
Visigenics
Workstation Group

Zip

Title

To have your Internet address listed here, please contact Paula Wright at (508) 620-7716
This index is provided as an additional service. The publisher does not assume any liability for errors or omissions.

#### HAVE A PROBLEM WITH YOUR COMPUTERWORLD SUBSCRIPTION?

We want to solve it to your complete satisfaction, and we want to do it fast.

Please write to:

COMPUTERWORLD, P.O. Box 2043, Marion, Ohio 43305-2043.

Your magazine subscription label is a valuable source of information for you and us. You can help us by attaching your magazine label here, or copy your name, address, and coded line as it appears on your label. Send this along with your correspondence.

#### Address Changes or Other Changes to Your Subscription

All address changes, title changes, etc. should be accompanied by your address label, if possible, or by a copy of the information which appears on the label, including the coded line.

Your New Address Goes Here Address shown: ☐ Home ☐ Business

Name Company Address State Zip

#### Other Questions and Problems

It is better to write us concerning your problem and include the magazine label. Also, address changes are handled more efficiently by mail. However, should you need to reach us quickly the following toll-free number is available: 1-800-669-1002 Outside U.S. call (614) 382-3322). Internet address: circulation@cw.com

COMPUTERWORLD allows advertisers and other companies to use its mailing list for selected offers we feel would be of interest to you. We screen these offers carefully. If you do not want to remain on the promotion list please write to the following address — COMPUTERWORLD, Circulation Department, 500 Old Connecticut Path, Framingham, MA 01701.

# Finance & Investing

# By Rosemary Cafasso

Using new online tools, investors can take charge of their 401(k) funds

Face it, you're getting older. But take heart, you're getting wiser, too.

Or at least you should be. It isn't enough to just dump a chunk of your salary in your company's 401(k) plan and ignore it. You now may be able to take advantage of new online services to better manage your nest egg.

So call your human resources department to find out what is available to you. An increasing number of companies are offering employees online access to their 401(k) fund so they can manage it themselves. Typically, companies are providing this service via their 401(k) plan manager, such as Fidelity Investments in Boston or The Vanguard Group of Investment Cos. in Valley Forge, Pa.

In addition, independent firms such as 401k Forum, Inc. in San Francisco are offering 401(k) planning services to companies to help educate their employees.

Since late last year, Fidelity and Vanguard have signed up nearly two dozen companies for their firms' 401(k) management software and services. These offerings let their clients' employees go online and check 401(k) balances and perform a range of tasks, such as changing the mix of funds.

Typically, client companies can provide their employees this service if they have desktop PCs and standard Internet access such as Netscape Communications Corp. browsers. In some cases, employers are opting to pay for a direct link to the fund manager's server so they aren't sending their employees onto the

Cost to employers will vary depending on the number of functions they select, the type of access they want to the fund manager's software and the amount of customization they request for their 401(k) management package. Fidelity, for instance, provides its service for free via the Internet.

Vanguard offers basic account balance access for free. It also will put together a full set of services via a direct link to its

er this year began testing Fidelity's 401(k)

management tools and now has nearly 500 employees regularly using them to manage their accounts, says Steve Heinrich, vice president of human resources

count at any given time and really see how it is performing," Heinrich says. "It's changed the way we interact with our 401(k)s from something we only had access to periodically to something that is at our fingertips anytime."

"People want to see how they are doing," says Fidelity's Frank Armo, of the firm's 401(k) management service

server with complete customization. That package can go as high as \$60,000, according to Shellie Unger, a principal of participant education services at Vanguard.

Since rolling out its 401(k) management tools in June, Fidelity has signed up 20 clients, says Frank Armo, a vice president at the company's Institutional Retirement Services Co.

Vanguard officially launched its 401(k) service in September 1995. It has publicly announced a few clients, including Compaq Computer Corp. and Bellcore. BBN Corp. in Cambridge, Mass., earli-

"The benefit is you can see your ac-

Bellcore in Morristown, N.J., has

signed up for the Vanguard 401(k) management service with a goal of implementing it by the end of January.

"A lot of people need help in this area," says John Michalizysen, a manager of pension and 401(k) savings plans at Bellcore. "We talk to employees about how much they should save, but going online will allow them to [create a retirement] model so they will know how much they need to save.'

Despite these benefits, observers say there likely will be a slow ramp up to online 401(k) management. In some cases, people may experience the same hesitation about executing 401(k) financial transactions online as they first experienced using automated teller machines when they came on the market years ago.

Armo notes that while a variety of companies have signed up for Fidelity's 401(k) tools, "it's the high-tech firms that are moving ahead more quickly." These companies typically have more of a readyto-go infrastructure, including PCs and Internet access.,

Once investors grow comfortable with online 401(k) management, they could well find it rewarding. Joe Craig, a scientist who works at an East Coast research firm, says he has been involved in a "selfdirected" 401(k) plan his company set up to give employees full control.

"It's nice in the sense that at the end of the day, there's no one to blame but myself," Craig says. "I like the way it's set up."

If your employer doesn't offer online tools, that doesn't mean you can't get more control over your 401(k) fund. Individual investors can find 401(k) education materials on their own by accessing such World Wide Web sites as www.401K.com, which is sponsored by Fidelity.



# Sure, reaching goals means taking chances.



Fortunately, choosing the right client/server accounting solution doesn't have to be one of them.

In the constantly changing business world, risk comes with the territory. Your challenge is to be ready for it.

Deal with it. Even take advantage of it. Which is why you need the most proven, reliable accounting solution out there: Platinum® SQL. • The leader in Microsoft SQL server and Sybase server environments,

Platinum SQL is easily customized to fit your company's particular requirements, and offers seamless integration with your other business applications. Its flexible architecture ensures adaptability to future needs. And all this comes with speedy setup and a quick learning curve. In short, Platinum SQL has reached the peak in price/performance.

• For more information, call 800-436-3846, or visit us at http://www.platsoft.com. Because while you may have to take an occasional chance in business, you'll have the confidence that your financial operation is on solid ground with Platinum SQL. Platinum Software Corporation, 195 Technology, Irvine, CA 92618-2402.

# Platinum SQL.



S2-WEEK RANGE

RAINBOW TECHNOLOGIES INC RED BRICK SYSTEMS INC SAPIENT CORP SCO INC

STATE OF THE ART

WK NET WK PC

-4 13 -0 19 3 25 1.25 0.25 0.81 1 63

# The Week in Stocks

#### **Gainers** Losers E N Streamlogic Corp. .. Radius Inc. .... Learning Co. (The) .

Data Race Inc.(H)       28.9         AST Research Inc.(L)       25.4         Edity Corp.(L)       25.0         Progress Software Corp.       24.8	Software Publishing Corp
D O L	L A R
Deil Computer Corp.(H)12.50 Gateway 2000 inc.(H)7.19	Cognos Inc.(H)5.50 Northern Telecom Ltd5.13

Western Digital Corp.(H) ... Silicon Graphics ............ McAfee Associates .......... Forte Software .....

### SystemSoft hurt by report

ystemSoft Corp. (Nasdaq:SYSF), a maker of systems software tools for desktop and portable personal computers, has a problem. Its stock has taken a beating lately, despite its solid financial performance.

The stock price slide (see chart) has occurred despite another quarter of record revenue and recently announced contracts for SystemSoft's SystemWizard support software. Revenue for the third quarter ended Oct. 31 was \$10.3 million, a 67% jump from the same period last year. Net income was \$1.7 million, up from \$826,000.

The trouble began with the release of a report from the Center for Financial Research and Analysis, a research firm in Rockville, Md. The report raised questions about SystemSoft's accounting practices. The research firm declined to comment last week. But SystemSoft and at least Wall Street analyst say the research firm was out of line in suggesting that the software company had inappropriately recorded some revenue.

Nonetheless, the suggestion of impropriety was enough to send the stock price down, says James Poyner, an analyst at Oppenheimer & Co. in New York. Poyner says the report is "full of baloney" and says he is sticking to his "buy" rating for System-Soft. Some investors also were rattled by the announcement of a contract with Packard Bell-NEC that they had expected to be larger. SystemSoft CEO Robert Angelo last week said the contract could bring in as much as \$20 million in the next three years, a figure the company didn't release originally.

But Poyner and other analysts say SystemSoft is in good shape overall. "I am saying [to investors], 'Put on your thinking caps here," Poyner says. "Don't let an ill-informed newsletter or the panic selling skew the facts for you." — Rosemary Cafasso

#### SYSTEMSOFT SLIDES



10/7 10/28 11/11 11/25 11/29 12/2 12/3

	_			-	-	80	
Ехсн	52-WEEK	RANGE 2 PM		DEC. 6	WK NET	Wk PcT	Ехсн
1		-	is and Network Services	_	UP 2.0		RNBO
COMS	79.75	33.50	3 COM CORP. (H)	79.63	4 06	54	REDB SAPE
AIT	66.88 68.88	49.63 33.25	AMERITECH CORP.	57.88 38.63	-0.88	-1.5 -0.6	SCOC
ASNO	74.88	28.75	ASCEND COMMUNICATIONS	69 50	-1.63	-2.3	SOTI SPCO
BNYN BAY	12.00 49.00	3.25 18.13	BAYNAN SYSTEMS INC. BAY NETWORKS INC.	6 00 24.25	1.75 -2.13	41.2 -8.1	SQAX SOTA
BEL	80.38 45.88	43.50 35.25	BELL ATLANTIC CORP. BELLSOUTH CORP	60.63 39.13	-1.88 -1.00	-3.0 -2.5	SSW SORC
BRKT CS	42.25 43.63	10.00 26.50	BROOKTROUT TECHNOLOGY CABLETRON SYSTEMS	29 63 40.88	-2.50 0.13	-7.8 0.3	SYBS SYMC
CSCC CGRM	91.25 24.13	20.63	CASCADE COMMUNICATIONS CENTIGRAM COMMUNICATIONS	67.63 13.63	-1.00 0.13	-1.5 0.9	SNPS
csco	68.88	32.00	CISCO SYSTEMS INC. (H)	65.25	-2.38	-3.5	SSAX SYSF
CLIX CMNT	9 25 10.50	3.50 4 00	COMPRESSION LABS INC. COMPUTER NETWORK TECH.	4.00 6.13	-0.13 0.00	-3.0 0.0	TRUV VIEW
XCOM OIGI	13.25 43.25	4.75 12.63	DSC COMMUNICATIONS	5.75 17.38	-0.38 -0.25	-6.1 -1.4	VMRK WALK
FORE GDC	44.75 20.38	23.38 9.13	FORE Systems Inc. General Oatacomm Inds.	38.63 11.00	-0.25 0.00	·0.6 0.0	WALL
GSX GTE	44.50 49.25	31.00 37.75	GENERAL SIGNAL NETWORKS (H) GTE CORP.	42.00 44.50	-0.50 -0.38	-1.2 -0.8	lacar.
LU	53.13	29.75	LUCENT TECH. (H)	48.75	-2.50	-4 9	Int
MAOGF MCIC	48.63 31.88	8.13 22.38	MADGE NETWORKS NV MCI COMMMUNICATIONS CORP.	10.88 31.75	1.88 1.50	20.8 5.0	AOL BBN
MNPI NETM	34.50 34.00	5.50 5.38	MICROCOM INC. NETMANAGEINC.	13.63 7.63	2.38 1.88	21.1 32.6	CSRV EOFY
NTRX NCDI	10.88 9.88	3.75 2.88	NETRIX CORP. NETWORK COMPUTING DEVICES	5.25 9.50	0.25 1.50	5.0 18.8	LCOS NETC
NWK NETG	36.00 27.63	11.13	NETWORK EQUIPMENT TECH.	14.13 24.25	-1.00 0.25	-6.6 1.0	NSCP
NN	37.25	19.25	NEWBRIDGE NETWORKS CORP.	29.50	0.63	2.2	OMKT PSIX
NT NOVL	67.63 17.00	40.13 8.75	NORTHERN TELECOM LTD. NOVELLING.	60.63 10.63	·5.13 ·0.38	-7.8 -3.4	Q OEK RAPT
NYN OCTL	59.25 31.75	42.00 12.63	NYNEX CORP. OCTEL COMMUNICATIONS CORP.	45.38 18.25	-0.88 0.38	•1.9 2.1	SCUR SPYG
O O SI	29.00 37.63	11.88 25.88	OPTICAL OATA SYSTEMS INC. PACIFIC TELESIS (H)	13.13 35.75	+0.06 -1.00	· 0.5 · 2.7	үноо
PCTL	44.72	24.50	PICTURETEL CORP.	29.25	1.25	4.5	Se
PTON RACO	7.88 7.00	2.06 3.50	PROTEON INC. RACOTEK INC.	3.56 4.75	-0.19 0.38	·5.0 8.6	AMO
RETX SBC	10.88	1.88 46.00	RETIX SBC COMMUNICATIONS	8.13 51.00	0.88 -1.50	12.1 -2.9	ADI CHPS
SFA SHVA	20.38 87.25	12.00 25.13	SCIENTIFIC ATLANTA INC. SHIVA CORP.	16.00 41.00	0.75 0.75	4.9 1.9	CRUS
FON	45.50	34.50	SPRINT CORP.	39.25	-2.38	-5.7	CYRX
SMSC USRX	21.13 105,50	8.38 32.75	STANDARD MICROSYSTEMS CORP. US ROBOTICS	11.25 74.63	0.63 1.88	5.9 2.6	INTC LSI
USW XIRC	37.50 21.75	27.25 9.50	U S WEST INC. XIRCOM	31.38 20.00	0.38 0.25	1.2 1.3	LSCC MCRL
XYLN	76.00	32.25	XYLAN CORP.	32.25	-3.25	-9.2	MU MOT
PC	s and W	orkst	ations		UP 9.0	00%	N5M TXN
AALR AAPL	14.13 40.13	5.88 16.00	ADVANCED LOGIC RESEARCH APPLE COMPUTER INC.	14 13 25,13	1.94 0.69	15.9 2.8	VLSI XLNX
ASTA CPO	10.00	3.94 35.88	AST RESEARCH INC. (L) COMPAQ COMPUTER CORP	5.25 82.63	1.06	25.4 5.1	ZLG
CPQ						12.5	Pe
OELL	112.50	23.00	OELL COMPUTER CORP. (H)	112.50	12.50	12.5	
GATE HWP	60.38 57.75	18.00 36.88	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO.	60.38 54.88	7.19 <b>0</b> .75	13.5	APCC
GATE HWP MUEI NIPNY	60.38 57.75 23.50 67.38	18.00 36.88 8.75 49.88	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA	60.38 54.88 18.88 60.25	7.19 0.75 0.13 -1.63	1.4 0.7 -2.6	_
GATE HWP MUEI	60.38 57.75 23.50	18.00 36.88 8.75	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC.	60.38 54.88 18.88	7.19 0.75 0.13	1.4 0.7	APCC ADPT
GATE HWP MUEI NIPNY SGI SUNW	60.38 57.75 23.50 67.38 38.75 70.25	18.00 36.88 8.75 49.88 17.88 36.00	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS	60.38 54.88 18.88 60.25 24.00 58.00	7.19 0.75 0.13 -1.63 4.50	1.4 0.7 -2.6 23.1 1.3	APCC ADPT CBEX CREAF RACE DTM EMC
GATE HWP MUEI NIPNY SGI SUNW	60.38 57.75 23.50 67.38 38.75	18.00 36.88 8.75 49.88 17.88 36.00	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS	60.38 54.88 18.88 60.25 24.00 58.00	7.19 0.75 0.13 -1.63 4.50 0.75	1.4 0.7 -2.6 23.1 1.3	APCC ADPT CBEX CREAF RACE DTM
GATE HWP MUEI NIPNY SGI SUNW	60.38 57.75 23.50 67.38 38.75 70.25 <b>'ge Sys</b> 13.50 19.13	18.00 36.88 8.75 49.88 17.88 36.00	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OATA GENERAL CORP.	60.38 54.88 18.88 60.25 24.00 58.00	7.19 0.75 0.13 -1.63 4.50 0.75	1.4 0.7 -2.6 23.1 1.3	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC EXBT
GATE HWP MUEI NIPNY SGI SUNW  Lar  AM H OGN OEC IBM	60.38 57.75 23.50 67.38 38.75 70.25 <b>'ge Sys</b> 13.50 19.13 76.50 166.00	18.00 36.88 8.75 49.88 17.88 36.00 <b>tems</b> 6.75 9.00 28.38 83.13	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H)	60.38 54.88 18.88 60.25 24.00 58.00 11.75 15.00 39.00 156.75	7.19 0.75 0.13 -1.63 4.50 0.75 <b>UP 3.2</b> 0.00 0.63 2.88 -2.50	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC EXBT IISLF
GATE HWP MUEI NIPNY SGI SUNW  Lar AM H OGN OEC IBM MDCD NETF	60.38 57.75 23.50 67.38 38.75 70.25 <b>ge Sys</b> 13.50 19.13 76.50 166.00 20.25 6.50	18.00 36.88 8.75 49.88 17.88 36.00 <b>tems</b> 6.75 9.00 28.38 83.13 6.50 2.38	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OGTAL EQUIPMENT CORP. IBM (H) MERIDIAN OATAINC. NET FRAME	60.38 54.88 18.88 60.25 24.00 58.00 11.75 15.00 39.00 156.75 7.00 2.88	7.19 0.75 0.13 -1.63 4.50 0.75 <b>UP 3.2</b> 0.00 0.63 2.88 -2.50 -0.50	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 -2.1	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG
GATE HWP MUEI NIPNY SGI SUNW  Lat  AM H OGN OEC IBM MDCD NETF SQNT SEQS	60.38 57.75 23.50 67.38 38.75 70.25 <b>92 Sys</b> 13.50 19.13 76.50 166.00 20.25 6.50 17.63 5.88	18.00 36.88 8.75 49.88 17.88 36.00 <b>tems</b> 6.75 9.00 28.38 83.13 6.50 2.38 10.13 1.88	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATAINC. NET FRAME SEQUENT COMPUTER SYS. SEQUENT COMPUTER SYS. SEQUENT SYSTEMS INC.	60.38 54.88 18.88 60.25 24.00 58.00 11.75 15.00 39.00 156.75 7.00 2.88 17.00 2.50	7.19 0.75 0.13 -1.63 4.50 0.75 <b>UP 3.2</b> 0.00 0.63 2.88 -2.50 -0.06 0.06 0.06	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 -2.1 0.4 14.3	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC EXBT IISLF IOM IPLS
GATE HWP MUEI NIPNY SGI SUNW  Lar AM H OGN OEC IBM MDCD NETF SQNT	60.38 57.75 23.50 67.38 38.75 70.25 <b>ge Sys</b> 13.50 19.13 76.50 166.00 20.25 6.50 17.63	18.00 36.88 8.75 49.88 17.88 36.00 <b>:tems</b> 6.75 9.00 28.38 83.13 6.50 2.38 10.13	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATAINC. NETFRAME SEQUENT COMPUTER SYS.	60.38 54.88 18.88 60.25 24.00 58.00 11.75 15.00 39.00 156.75 7.00 2.88 17.00	7.19 0.75 0.13 -1.63 4.50 0.75 <b>UP 3.2</b> 0.00 0.63 2.88 2.50 -0.50 -0.06	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 -2.1 0.4	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC ESUS ISSIF IOM IPLS KMAG MTSI PEAK PNCL
CATE HWP MUEI NIPNY SGI SUNW  Lar AM H OGN OEC IBM MDCD NETF SQNT SEQS SRA	60.38 57.75 23.50 67.38 38.75 70.25 <b>9 Sys</b> 13.50 19.13 76.50 166.00 20.25 6.50 17.63 5.88 35.00	18.00 36.88 8.75 49.88 17.88 36.00 <b>:tems</b> 6.75 9.00 28.38 83.13 6.50 2.38 10.13 1.88 16.63	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OGATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATA INC. NETFRAME SEQUENT COMPUTER SYS. SEQUENT SYSTEMS INC. STRATUS COMPUTER INC.	60.38 54.88 18.88 60.25 24.00 58.00 111.75 15.00 39.00 156.75 7.00 2.88 17.00 2.50 26.50	7.19 0.75 0.13 -1.63 4.50 0.75 <b>UP 3.2</b> 0.00 0.63 2.88 2.50 -0.50 -0.06 0.31 1.13	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 -2.1 0.4 14.3 4.4	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC EXBIT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM
CATE HWP MUEI NIPNY SGI SUNW  LAT  AM H OGN OEC IBM MDCD NETF SQNT SEQS SRA TOM UIS	60.38 57.75 23.50 67.38 38.75 70.25 <b>Ge Sys</b> 13.50 19.13 76.50 166.00 20.25 6.50 17.63 5.88 35.00 15.25	18.00 36.88 8.75 49.88 17.88 36.00 <b>items</b> 6.75 9.00 28.38 83.13 6.50 2.38 10.13 1.88 16.63 8.38	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATA INC. NETFRAME SEQUENT COMPUTER SYS. SEQUIOL SYSTEMS INC. STRATUS COMPUTER INC. TANDEM COMPUTER INC.	60.38 54.88 18.88 60.25 24.00 58.00 11.75 15.00 39.00 156.75 7.00 2.88 17.00 2.50 26.50 14.00	7.19 0.75 0.13 -1.63 4.50 0.75 UP 3.2 0.00 0.63 2.88 2.50 -0.50 -0.06 0.06 0.31 1.13 0.13	1.4 0.7 -2.6 23.1 1.3 22.9% 0.0 4.3 8.0 -1.6 -6.7 -2.1 0.4 14.3 4.4 0.9 13.5	APCC ADPT CBEX CREAF RACE DTM EMC ESCC EXBT IISLF ION IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG
CATE HWP MUEI NIPNY SGI SUNW  Lar  AM H OGN OEC NETF SQNT SEQS SRA TOM UIS  AOBE	60.38 57.75 23.50 67.38 38.75 70.25 13.50 19.13 76.50 166.00 20.25 6.50 17.63 5.88 35.00 15.25 9.13	18.00 36.88 8.75 49.88 17.88 36.00 <b>:tems</b> 6.75 9.00 28.38 83.13 6.50 2.38 10.13 1.88 16.63 8.38 5.38	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OGATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATA INC. NETFRAME SEQUENT COMPUTER SYS. SEQUOIA SYSTEMS INC. TANDEM COMPUTERS INC. TANDEM COMPUTERS INC. UNISYS CORP.	60.38 54.88 18.88 60.25 24.00 58.00 11.75 15.00 39.00 156.75 7.00 2.88 17.00 2.50 26.50 14.00 7.38	7.19 0.75 0.13 -1.63 4.50 0.75 UP 3.2 0.00 0.63 2.88 2.50 -0.50 -0.06 0.06 0.03 1.113 0.13	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 -2.1 0.4 14.3 4.4 0.9 13.5 2.8	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC EXBIT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK
CATE HWP MUEI NIPNY SGI SUNW  Lar AM H OGN OEC IBM MDCD NETF SQNT SEQNT	60.38 57.75 23.50 67.38 38.75 70.25 13.50 19.13 76.50 166.00 20.25 6.50 17.63 5.88 35.00 15.25 9.13 42.50	18.00 36.88 8.75 49.88 17.88 36.00 <b>tems</b> 6.75 9.00 28.38 83.13 6.50 2.38 10.13 1.88 16.63 8.38 28.50 3.63 18.13	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATAINC. NETFRAME SEQUENT COMPUTER SYS. SEQUOIA SYSTEMS INC. STRATUS COMPUTER INC. TANDEM COMPUTERS INC. UNISYS CORP.  ADOBE SYSTEMS INC. APPLIX INC. APPLIX INC. APPLIX INC.	60.38 54.88 18.88 60.25 24.00 58.00 11.75 15.00 39.75 7.00 2.88 17.00 2.50 26.50 14.00 7.38	7.19 0.75 0.13 1.63 4.50 0.75 UP 3.2 0.00 0.63 2.88 2.50 0.06 0.06 0.06 0.03 1.13 0.13 0.13 0.13 0.13	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 -2.1 0.4 14.3 4.4 0.9 13.5 39% 2.8 5.4 7.2	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC EXBIT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC
CATE HWP MUEI NIPNY SGI SUNW  LAT  AM H OGN OEC IBM MDCD NETF SQNT SQNT SQNT SQNT SQNT SQNT SQNT AOBE AM SWA APLX AR SWA APLX AR SWA AOSK	60.38 57.75 23.50 67.38 38.75 70.25 <b>ge Sys</b> 13.50 19.13 76.50 166.00 20.25 6.50 17.63 5.88 35.00 15.25 9.13 42.50 82.75 44.25	18.00 36.88 8.75 49.88 17.88 36.00 <b>tems</b> 6.75 9.00 28.38 83.13 6.50 2.38 10.13 1.88 5.38 2.38 5.38	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATA INC. NETFABME SEQUENT COMPUTER SYS. SEQUENT COMPUTER INC. TANDEM COMPUTER INC. UNISYS CORP.  ADOBE SYSTEMS INC. APPLIX INC. APPLIX INC. APPLIX INC. APPLIX INC. ARBOR SOFTWARE (L) AUTO DESK INC.	60.38 54.88 60.25 24.00 58.00 11.75 15.00 156.75 7.00 2.50 2.50 2.50 14.00 7.38	7.19 0.75 0.13 -1.63 4.50 0.75 0.00 0.63 2.88 2.50 -0.06 0.06 0.06 0.01 1.13 0.88 UP 1. 1.13 -0.31 1.38 1.50	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 -2.1 0.4 14.3 4.4 0.9 13.5 39% 2.8 5.4 7.2 6.0 4.7	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC
CATE HWP MUEI NIPNY SGI SUNW  Lar  AM H OGN OEC IBM MDCD NETF SQNT SEQS SRA TOM UIS  AOBE AM SWA APLX ARSW	60.38 57.75 23.50 67.38 38.75 70.25 13.50 19.13 76.50 166.00 20.25 6.50 17.63 5.88 35.00 15.25 9.13 42.50 74.25 71.13 42.50 82.75	18.00 36.88 8.75 49.88 17.88 36.00 28.38 83.13 6.50 2.38 10.13 1.88 5.38 28.50 3.63 18.13 21.00	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OGATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATA INC. NETFRAME SEQUENT COMPUTER SYS. SEQUOIA SYSTEMS INC. TANDEM COMPUTERS INC. TANDEM COMPUTERS INC. UNISYS CORP.  ADOBE SYSTEMS INC. AMERICAN SOSTWARE INC. APPLIX INC. ARBOR SOSTWARE (L)	60.38 54.88 18.88 60.25 24.00 58.00 11.75 15.00 39.00 156.75 7.00 2.50 14.00 7.38 40.75 5.50 26.50 26.50 27.75 23.00	7.19 0.75 0.13 -1.63 4.50 0.75 UP 3.2 0.00 0.63 2.88 2.50 -0.06 0.06 0.06 0.31 1.13 0.88 UP 1 1.13 -0.31 1.30 1.25 0.25	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 -2.1 0.4 14.3 4.4 0.9 13.5 39% 2.8 -5.4 7.2 -6.0 4.7 -1.1 -2.0	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC EXBIT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC
AM HOGN OEC IBM MDCD NETF SQNT SEQS SRA TOM UIS	60.38 57.75 23.50 67.38 38.75 70.25 19.13 76.50 166.00 20.25 6.50 17.63 5.88 35.00 15.25 9.13 42.50 82.75 44.25 26.25 46.75 32.50	18.00 36.88 8.75 49.88 17.88 36.00 <b>tems</b> 6.75 9.00 28.38 83.13 6.50 2.38 10.13 1.88 5.38 2.38 2.38 10.13 1.88 10.13 1.88 1.83 5.38	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATAINC. NETFRAME SEQUENT COMPUTER SYS. SEQUENT COMPUTER SINC. STRATUS COMPUTER INC. TANDEM COMPUTERS INC. UNISYS CORP.  ADDBE SYSTEMS INC. AMERICAN SOFTWARE INC. APPLIX INC. ABBOS SOFTWARE (L) AUTO DESK INC. BGS SYSTEMS INC. (H) BMC SOFTWARE INC. BG SYSTEMS INC. (H) BMC SOFTWARE INC.	60.38 54.88 18.88 60.25 24.00 58.00 11.75 11.75 15.00 39.00 156.75 7.00 2.88 17.00 17.00	7.19 0.75 0.13 1.63 4.50 0.75 UP 3.2 0.00 0.63 2.88 2.50 0.06 0.06 0.06 0.03 1.13 0.13 0.88 UP 1	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 -2.1 0.4 14.3 4.4 0.9 13.5 39% 2.8 -5.4 7.2 6.0 4.7	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX
CATE HWP MUEI NIPNY SGI SUNW  Lar  AM H OGN OEC IBM MDCD NETF SQNT SEQS SRA TOM UIS  SOI  AOBE AMSWA APLX ARSW AOSK BGSS BOOL BORL BORL	60.38 57.75 23.50 67.38 38.75 70.25 13.50 19.13 76.50 166.00 20.25 6.50 17.63 5.88 35.00 15.25 9.13 42.50 42.55 44.25 26.25 26.25 26.25 27.32 26.25 26.25 26.25 27.32 28.25 28	18.00 36.88 8.75 49.88 17.88 36.00 6.75 9.00 28.38 83.13 6.50 2.38 10.13 1.88 2.38 3.13 1.83 2.38 3.13 1.83 1.84 2.38 3.13 4.50 3.63 3.63 3.63 3.63 3.63 3.63 3.63 3.6	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OGATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATA INC. NETFRAME SEQUENT COMPUTER SYS. SEQUOIA SYSTEMS INC. TANDEM COMPUTERS INC. UNISYS CORP.  ADOBE SYSTEMS INC. AMERICAN SOFTWARE INC. APPLIX INC. ABBOR 5 OFTWARE (L) AUTO DESK INC. BOS SYSTEMS INC. (H) BMC SOFTWARE INC. BOOLE AND BABBAGE BORLAND INT'L INC. BOOLE AND BABBAGE BORLAND INT'L INC. BUSINESS OBJECTS	60.38 54.88 18.88 60.25 24.00 58.00 11.75 15.00 39.00 156.75 7.00 2.50 14.00 7.38 40.75 5.50 20.	7.19 0.75 0.13 -1.63 4.50 0.75 UP 3.2 0.00 0.63 2.88 2.50 -0.06 0.06 0.06 0.31 1.13 0.88 UP 1 1.13 -0.31 1.30 1.25 0.25	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 -2.1 0.4 14.3 4.4 0.9 13.5 39% 2.8 -5.4 7.2 -6.0 4.7 -1.1 -2.0 0.0 9.9 9.9 9.9 9.9 9.9 9.9 9.9 9.9 9	APCC ADPT CBEX CREAF RACE DTM EMC EMC EMLX ESCC EXBIT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  ANLY ANLY AUD
CATE HWP MUEI NIPNY SGI SUNW  LAT  AM H OGN OEC IBM MDCD NETF SQNT SEQS SRA TOM UIS  AOBE AM SWA AOSK BGSS BM CS BM CS BOOL BOOL BOOL BOOL CATE BOOL CATE BOOL CONTR	60.38 57.75 23.50 67.38 38.75 70.25 13.50 19.13 76.50 166.00 20.25 6.50 17.63 5.88 35.00 15.25 9.13 20.25 41.25 74.25 74.25 74.25 74.25 74.25 74.25 74.25 75.25 76.7	18.00 36.88 8.75 49.88 17.88 36.00 28.38 83.13 10.13 11.80 11.81 12.100 18.50 18.50 18.50 19.75 86.3 4.75 86.3 4.00 4.75 8.63 4.00 4.75	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATAINC. NETFRAME SEQUENT COMPUTER SYS. SEQUOIA SYSTEMS INC. STRATUS COMPUTER INC. TANDEM COMPUTERS INC. UNISYS CORP.  ADDBE SYSTEMS INC. AMERICAN SOFTWARE INC. ARBOR SOFTWARE (L) AUTO DESK INC. BOOLE AND BABBAGE BORLAND INT'L INC. BUSINESS OBJECTS CAYENNE SOFTWARE INC.	60.38 54.88 18.88 60.25 24.00 58.00 11.75 15.00 39.00 156.75 7.00 2.88 17.00 1	7.19 0.75 0.13 1.63 4.50 0.75 0.00 0.63 2.88 2.50 0.06 0.06 0.06 0.31 1.13 0.13 0.88 1.50 1.25 0.81 1.025 0.88 0.05 0.05 0.06 0.06 0.06 0.07 0.06 0.07 0.06 0.07	1,4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 -2.1 0.4 14.3 0.9 13.5 2.8 -5.4 7.2 6.0 4.7 2.6 0.0 4.3 1.5 2.1 0.9 13.5	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC EXBIT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  AMNLY AUD BOMII CATP
AM HOGN OEC IBM MDCD NETF SQNT SEQS SRA TOM UIS	60.38 57.75 23.50 67.38 38.75 70.25 13.50 19.13 76.50 166.00 20.25 6.50 17.63 5.88 35.00 15.25 9.13 42.50 82.75 44.25 71.3 42.50 82.75 44.25 26.25 46.75 32.75 44.25 26.25 46.75 32.75 44.25 26.25 46.75 32.75 44.25 26.25 46.75 32.75 44.25 26.25 46.75 32.75 44.25 26.25 46.75 32.75 44.25 26.25 46.75 32.75 44.25 26.25 46.75 32.75 44.25 26.25 46.75 32.75 44.25 26.25 46.75 32.75 44.25 26.25 46.75 32.75 44.25 26.25 46.75 32.75 44.25 26.25 46.75 32.75 44.25 26.25 46.75 32.75 44.25 26.25 46.75 32.75 44.25 27.13 30.63 30.88 71.88	18.00 36.88 8.75 49.88 17.88 17.88 6.75 9.00 28.38 83.13 10.13 18.50 2.38 16.63 8.38 5.38 650 2.38 16.63 8.38 18.63	GATEWAY 2000 INC. (H)  HEWLETT PACKARD CO.  MICRON INTERNATIONAL INC.  NEC AMERICA  SILICON GRAPHICS  SUN MICROSYSTEMS INC.  AMDAHL CORP.  OATA GENERAL CORP.  OIGITAL EQUIPMENT CORP.  IBM (H)  MERIDIAN OATA INC.  NETFRAME  SEQUENT COMPUTER SYS.  SEQUENT COMPUTER INC.  STRATUS COMPUTER INC.  TANDEM COMPUTERS INC.  UNISYS CORP.  ADOBE SYSTEMS INC.  AMERICAN SOFTWARE INC.  APPLIX INC.  BUS SYSTEMS INC.  CAPPUNE INC.  BUS SYSTEMS INC.  CAPPUNE SOFTWARE INC.  CAYENNE SOFTWARE INC.  CAYENNE SOFTWARE INC.  CHUURA SOFTWARE INC.  COONDS INC. (H)	60.38 54.88 18.88 60.25 24.00 58.00 11.75 11.75 15.00 39.00 156.75 7.00 2.88 17.00 17.00	7.19 0.75 0.13 -1.63 4.50 0.75  UP 3.2 0.00 0.63 2.88 2.50 -0.06 0.06 0.01 1.13 0.13 1.38 1.50 1.25 0.25 0.80 0.08 1.025 0.81 0.25 0.81 0.25	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 0.1.6 -6.7 -2.1 0.4 14.3 4.4 0.9 13.5 39% 2.8 5.4 7.2 6.0 4.7 -1.1 -2.0 0.0 9.8 -1.1 -2.1 -2.1 -2.1 -2.1 -2.1 -2.1 -2.1	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  AMSY ANLY AUD BOMI
CATE HWP MUEI NIPNY SGI SUNW  Lar  AM H OGN OEC IBM MDCD NETF SQNT SEQS SRA TOM UIS  SOI  AOBE AMSWA APLX ARSWA APLX BGSS BOOL BORL BORL BOBL CYTE	60.38 57.75 23.50 67.38 38.75 70.25 13.50 19.13 16.50 16.60 20.25 6.50 17.63 5.88 35.00 15.25 9.13 42.50 27.13 42.50 26.75 44.25 26.25 26.75 32.50 21.25 26.75 32.50 21.25 21.	18.00 36.88 8.75 49.88 17.88 8.75 6.75 6.75 9.00 28.38 8.31 6.50 28.38 10.13 1.88 28.50 3.63 3.63 12.100 18.50 18.63	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OGATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATA INC. NETFRAME SEQUENT COMPUTER SYS. SEQUOIA SYSTEMS INC. TANDEM COMPUTERS INC. UNISYS CORP.  ADOBE SYSTEMS INC. AMERICAN SOFTWARE INC. APPLIX INC. APPLIX INC. APPLIX INC. ABOR 5 OFTWARE (L) AUTO DESK INC. BOOLE AND BABBAGE BORLAND INT'L INC. BUSINESS OBJECTS CAYENNE SOFTWARE INC. CLENTURS SOFTWARE INC.	60.38 54.88 18.88 60.25 24.00 58.00 11.75 15.00 39.00 156.75 7.00 2.50 14.00 7.38 40.75 5.50 20.50 20.50 20.77,5 23.00 24.28 29.00 42.80 42.80 40 40 40 40 40 40 40 40 40 40 40 40 40	7.19 0.75 0.13 -1.63 4.50 0.75 UP 3.2 0.00 0.63 2.88 2.50 -0.06 0.06 0.06 0.31 1.13 0.88 UP 1 1.13 -0.31 1.25 0.25	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 -2.1 0.4 14.3 4.4 0.9 13.5 39% 2.8 -5.4 7.2 0.0 4.7 -1.1 -2.0 0.0 9.9 1.2 -1.2 -1.2 -1.2 -1.2 -1.2 -1.2 -1.2	APCC ADPT CBEX CREAF RACE DTM EMC EMCL ESCC EXBT IISLF IOM IPLS KMAGI MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  AMSY ANLY AUD BOMI CATP CEN
CATE HWP MUEI NIPNY SGI SUNW  LAIT AM H OGN OEC IBM MDCD NETF SQNT SEQS SRA TOM UIS  SOI  AOBE AMSWA APLX ARSW AOSK BGSS BMCS BMCS BORL BOBJY CAYN CNTR CYE COGNE CA CVN CPWR	60.38 57.75 23.50 67.38 38.75 70.25 13.50 19.13 76.50 166.00 20.25 6.50 17.63 5.88 35.00 15.25 9.13 42.50 82.75 44.25 74.25 44.25 26.25 46.75 32.75 44.25 71.13 30.63 39.50 20.21 20.2	18.00 36.88 8.75 49.88 17.88 8.75 49.88 10.13 16.63 8.31 10.13 18.50 14.88 18.63 18.13 21.00 26.38 18.63 18.13 31.00 26.31 31.00 26.31 31.00 26.31 31.00 26.31	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATA INC. NETFRAME SEQUENT COMPUTER SYS. SEQUENT COMPUTER SINC. STRATUS COMPUTER INC. TANDEM COMPUTERS INC. UNISYS CORP.  ADOBE SYSTEMS INC. AMERICAN SOFTWARE INC. APPLIX INC. BUSINESS OBJECTS CAYENNE SOFTWARE INC. BUSINESS OBJECTS CAYENNE SOFTWARE INC. CUNTURA SOFTWARE INC. CONDOIS INC. (H) COMPUTER ASSOCIATES COMPUTER WISSION CORP. COMPUTER SOFT.	60.38 54.88 18.88 60.25 24.00 58.00 11.75 11.75 15.00 39.00 156.75 7.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 17.00 18.00	7.19 0.75 0.13 -1.63 4.50 0.75  UP 3.2 0.00 0.63 2.88 2.50 -0.06 0.06 0.01 1.13 0.13 1.13 0.13 1.38 1.50 1.25 0.88 0.00 0.81 0.25 0.88 0.00 0.00 0.88 0.00 0	1,4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 -2.1 0.4 14.3 0.9 13.5 39% 2.8 -5.4 7.2 6.0 4.7 2.6 0.0 4.3 -1.6 -1.6 -1.6 -1.6 -1.6 -1.6 -1.6 -1.6	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  AMSY ANLY AUD BOMI CATP CEN COO CHRZ CSC TSK
CATE HWP MUEI NIPNY SGI SUNW  Lar  AM H OGC IBM MDCD NETF SQNT SEQS SRA TOM UIS  SOI  AOBE AMSWA APLX AOSK BGSS BOOL BORL BOBL BOBL CYE COGNE CAY CPWR CCSRE COSFF	60.38 57.75 23.50 67.38 38.75 70.25 13.50 19.13 16.50 16.60 20.25 6.50 17.63 5.88 35.00 15.25 9.13 42.50 21.25 42.55 44.25 26.25 21.25 26.25 21.25 26.25 21.25 26.25 21.25 26.25 21.25 26.25 21.25 26.25 27.25 26.25 27.	18.00 36.88 8.75 49.88 17.88 8.75 6.75 6.90 28.38 83.13 6.50 28.38 83.13 1.88 28.50 3.63 18.50 18.50 18.50 14.83 19.75 4.75 4.75 4.75 4.75 6.56	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OGTAL EQUIPMENT CORP. DIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATA INC. NETFRAME SEQUENT COMPUTER SYS. SEQUOIA SYSTEMS INC. TANDEM COMPUTERS INC. TANDEM COMPUTERS INC. UNISYS CORP.  ADOBE SYSTEMS INC. AMERICAN SOFTWARE INC. APPLIX INC. APPLIX INC. ABOR 5 OFTWARE (L) AUTO DESK INC. BOOLE AND BABBAGE BORLAND INT'L INC. BUSINESS OBJECTS CAYENNE SOFTWARE INC. COCONOS INC. (H) COMPUTER ASSOCIATES COMPUTER VISION CORP. COMPUTARE CORP.	60.38 54.88 18.88 60.25 24.00 58.00 11.75 15.00 39.00 156.75 7.00 2.50 2.50 14.00 7.38 40.75 5.50 22.50 20.50 27.75 23.00 42.88 29.00 42.8	7.19 0.75 0.13 -1.63 4.50 0.75 0.00 0.63 2.88 2.50 -0.06 0.06 0.31 1.13 0.88  UP 1 1.13 -0.31 1.38 1.50 1.25 0.25 0.05 0.06 0.01 1.00 0.00 0.01 1.00 0.00 0.00	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 -2.1 0.4 14.3 4.4 0.9 13.5 39% 2.8 -5.4 7.2 6.0 4.7 -1.1 -2.0 0.0 -9.8 -2.0 -1.4 -3.7 -1.1 -2.0 -1.4 -3.7 -1.4 -3.7 -1.4 -3.7 -1.4 -3.7 -1.4 -3.7 -1.4 -3.7 -1.4 -3.7 -3.7 -3.7 -3.7 -3.7 -3.7 -3.7 -3.7	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  ANLY AUD BOMI CATP CCD CCHC CSC TSK CPU COAT
CATE HWP MUEI NIPNY SGI SUNW  Lar  AM H OGC IBM MDCD NETF SQNT SEQS SRA TOM UIS  AOBE AM SWA AOSK BOOL BOBJY CAYN CYE COG NF CA CVN CPWR CYE COSFF OWTI	60.38 57.75 23.50 67.38 38.75 70.25 13.50 166.00 20.25 6.50 17.63 5.88 35.00 15.25 9.13 24.25 74.25 74.25 74.25 42.5 42.5 46.75 32.50 82.75 44.25 55.50 82.75 82.75 82.75 82.75 82.75 82.75 83.90	18.00 36.88 8.75 49.88 17.88 8.75 49.88 10.13 16.50 28.38 83.13 6.50 28.38 10.13 11.13 21.00 18.50 18.	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATAINC. NETFRAME SEQUENT COMPUTER SYS. SEQUOIA SYSTEMS INC. STRATUS COMPUTER INC. TANDEM COMPUTERS INC. UNISYS CORP.  ADOBE SYSTEMS INC. AMERICAN SOFTWARE INC. ARBOR SOFTWARE (L) AUTO DESK INC. BUSINESS OBJECTS CAYENNE SOFTWARE INC. BUSINESS OBJECTS CAYENNE SOFTWARE INC. CONSINC. (H) COMPUTER ASSOCIATES COMPUTERVISION CORP. COMSUMER CORP.	60.38 54.88 18.88 60.25 24.00 58.00 11.75 7.00 29.00 156.75 7.00 26.50 14.00 7.38 40.75 5.50 26.50 26.50 27.75 28.80 29.00 42.88 29.00 42.80 42.	7.19 0.75 0.13 -1.63 4.50 0.75  UP 3.2 0.00 0.63 2.88 2.50 -0.50 0.06 0.06 0.01 1.13 0.13 0.13 0.88  UP 1.2 1.13 -0.31 1.38 1.50 1.25 -0.88 0.00 -0.5 0.05 -0.13 0.00 -0.13 0.00 -0.19 -0.13 2.63	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 -2.1 0.4 14.4 0.9 13.5 39% 2.8 -5.4 7.2 6.0 4.7 -2.0 0.0 4.3 -7.1 1.1 -2.0 0.0 -1.6 -1.0	APCC ADPT CBEX CREAF RACE DTM EMC EMC EMLX ESCC EXBIT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  SEC TEK COC TEK COC TEN COO CHRZ CSC TSK CPU COAT EGGS EOS
GATE HWP MUEI NIPNY SGI SUNW  LAIT  AM H OGN OEC IBM MDCD NETF SQNT SEQS SRA TOM UIS  AOBE AMSWA AOSK BMOSL BORL BOBY CAYN CNTR CYE CA CVN CPWR CSRE COSFE OWTI FILE FRTE FRTE FRTES	60.38 57.75 23.50 67.38 38.75 70.25 13.50 166.00 20.25 6.50 17.63 5.88 35.00 15.25 9.13 44.25 74.25 74.25 46.75 32.50 82.75 44.25 26.25 46.75 32.50 81.75 82.75 82.75 82.75 82.75 83.75 83.75 84.65 83.75 84.65 85.88 85.88 86.88 86.88 87.8	18.00 36.88 8.75 49.88 17.88 8.75 49.88 31.33 6.00 28.38 83.13 10.13 1.65 2.38 16.63 8.38 16.63 8.38 16.63 18.13 21.00 26.38 18.63 18.13 21.00 26.38 18.63 18.13 21.00 26.31 18.50 14.88 18.63 14.13 11.33 38.86 5.75 6.56 6.31 30.00 24.75	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATAINC. NETFRAME SEQUENT COMPUTER SYS. SEQUOIA SYSTEMS INC. STRATUS COMPUTER INC. TANDEM COMPUTER INC. UNISYS CORP.  ADOBE SYSTEMS INC. AMERICAN SOFTWARE INC. BUSINESS OBJECTS CAYENNE SOFTWARE INC. BUSINESS OBJECTS CAYENNE SOFTWARE INC. CENTURA SOFTWARE INC. COMPSIENC. (H) COMPSIENC. (H) COMPUTER ASSOCIATES COMPUTER YOUNG. COMPUTER ASSOCIATES COMPUTER YOUNG. COMPUTER ASSOCIATES COMPUTER YOUNG. COMPUTER CORP. COMSHARE INC. CONTAINED. COMPUTER ASSOCIATES COMPUTER YOUNG. COMPUTER SOFTWARE INC. COTAL WARE TECHNOLOGIES INC. (L) FILENET CORP. FORTE SOFTWARE INC.	60.38 54.88 18.88 60.25 24.00 58.00 11.75 15.00 39.00 156.75 02.50 26.50 14.00 7.38 40.75 5.50 26.50 14.00 7.38 27.75 20.50 20	7.19 0.75 0.13 -1.63 4.50 0.75 0.03 -2.88 2.50 -0.50 -0.66 0.06 0.06 0.31 1.13 0.13 0.13 0.88 1.50 1.25 0.88 0.00 0.81 0.025 -0.88 0.00 0.81 0.025 -0.88 0.00 0.81 0.00 -1.30 0.00 -1.30 0.00 -1.30 0.00 -1.30 0.00 -1.30 0.00 -1.30 0.00 -1.30 0.00 -1.30 0.00 -1.30 0.00 -1.30 0.00 -1.30 0.00 -1.30 0.00 -1.30 0.00 -1.30 0.00 -1.30 0.00 -1.30 0.00 -1.30 0.00 -1.30 0.00 -1.30 0.00	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 0.1.6 -6.7 -2.1 0.4 14.3 4.4 0.9 13.5 39% 2.8 6.0 4.7 -1.1 -2.0 0.0 9.8 -2.1 -1.1 -2.0 -1.4 -3.7 0.0 -1.4 -1.1 -2.0 -1.4 -1.1 -2.0 -1.1 -1.1 -2.1 -1.1 -2.1 -1.1 -1.1 -1.1	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  ANLY AUD BOMII CATP CEN COO CHRZ CSC TSK CPU COAT EGGS EOS INAC
AOBE AMSWA AOSK BGSS BOOL BOBL CYE COGNEC CON CPWR COSFF OWTI FILE	60.38 57.75 23.50 67.38 38.75 70.25 13.50 166.00 20.25 6.50 17.63 5.88 35.00 15.25 9.13 44.25 74.25 74.25 46.75 32.50 82.75 44.25 26.25 46.75 32.50 81.75 82.75 82.75 82.75 82.75 83.75 83.75 84.65 83.75 84.65 85.88 85.88 86.88 86.88 87.8	18.00 36.88 8.75 49.88 17.88 8.75 6.75 6.90 28.38 83.13 6.50 28.38 83.13 1.88 83.13 1.88 10.13 10.13	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATA INC. NETFRAME SEQUENT COMPUTER SYS. SEQUOIA SYSTEMS INC. TANDEM COMPUTERS INC. TANDEM COMPUTERS INC. UNISYS CORP.  ADOBE SYSTEMS INC. AMERICAN SOFTWARE INC. APPLIX INC. APPLIX INC. ABOOR SOFTWARE (L) AUTO DESK INC. BOOLE AND BABBAGE BORLAND INT'L INC. BUSINESS OBJECTS CAYENNE SOFTWARE INC. COGNOS INC. (H) COMPUTER ASSOCIATES COMPUTER VISION CORP. COMPUTAR SOFTWARE INC. COCONS INC. (H) COMPUTER ASSOCIATES COMPUTER VISION CORP. COMPUTAR SOFTWARE INC. COGNEL CORP. COMPUTARE CORP. COMPUTARE CORP. COMPUTARE TECHNOLOGIES INC. (L) FILENET CORP. FORTE SOFTWARE	60.38 54.88 60.25 24.00 58.00 11.75 15.00 39.00 156.75 7.00 2.50 2.50 14.00 7.38 40.75 5.50 22.50 20.50 27.75 23.00 42.53 29.00 42.53 23.03 31.50 61.75 7.75 3.03 31.50 40.75 3.03 3.03 3.03 3.03 4.03 4.03 4.03 4.03	7.19 0.75 0.13 -1.63 4.50 0.75 0.00 0.63 2.88 2.50 -0.06 0.06 0.31 1.13 0.13 0.88  UP 1 1.13 -0.31 1.38 1.50 1.25 0.25 0.05 0.06 0.01 1.30 0.31 1.33 0.31 1.38 0.31 1.38 0.31 1.38 0.31 1.38 0.31 1.38 0.31 1.38 0.31 1.38 0.31 1.38 0.31 1.38 0.31 1.38 0.31 1.38 0.31 0.31 0.31 0.31 0.31 0.31 0.31 0.31	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 -2.1 0.4 14.3 4.4 0.9 13.5 2.8 -5.4 7.2 6.0 4.7 -1.1 -2.0 0.0 -9.8 -2.0 -1.4 -3.7 -1.1 -2.0 -1.6 -1.6 -1.6 -1.6 -1.6 -1.6 -1.6 -1.6	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  ANLY AUD BOMI CATP CEO CHRZ CSC TSK CPU COAT EGGS EOS INAC
GATE HWP MUEI NIPNY SGI SUNW  LAIT  AM H OGN OEC IBM MDCD NETF SQNT SEQNT SEQN	60.38 57.75 23.50 67.38 38.75 70.25 70.25 13.50 19.13 76.50 166.00 20.25 6.50 17.63 5.88 35.00 15.25 9.13 44.25 7.13 44.25 7.13 44.25 46.75 32.50 82.75 44.25 55.50 11.88 15.50 61.00 32.00 11.88 15.50 61.00 61.00 62.00 63.00 63.00 63.00 63.00 63.00 63.00 63.00 63.00 63.00 64.00 65.00 66.00 66.00 66.00 66.00 66.00 67.00	18.00 36.88 8.75 49.88 17.88 8.75 49.88 10.13 16.63 8.38 10.13 18.50 18.53 18.13 21.00 26.38 18.63 18.13 21.00 26.38 18.63 18.13 21.00 26.38 18.63 18.75 4.75 8.63 14.13 11.13 33.88 5.75 5.75 6.56 6.50 10.75 6.56 6.50 6.50 6.50 6.50 6.50 6.50 6.5	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATAINC. NETFRAME SEQUENT COMPUTER SYS. SEQUOIA SYSTEMS INC. STRATUS COMPUTER INC. TANDEM COMPUTERS INC. UNISYS CORP.  ADOBE SYSTEMS INC. AMERICAN SOFTWARE INC. APPLIX INC. ABBOR 5 OFTWARE (L) AUTO DESK INC. BUSINESS OBJECTS CAYENNE SOFTWARE INC. BUSINESS OBJECTS CAYENNE SOFTWARE INC. CONNOS INC. (H) COMPUTER ASSOCIATES COMPUTERVISION CORP. COMPUTER SOFTWARE INC. COMPUTER SOFTWARE TO COMPUTER SOFTWARE INC. COMPUTER SOFTWARE TO COMPUTER SOFTWARE	60.38 54.88 18.88 60.25 24.00 58.00 11.75 7.00 2.88 17.00 26.50 14.00 7.38 40.75 5.50 26.50 26.50 27.75 20.20 42.88 29.00 42.88 29.00 42.88 29.00 42.88 29.00 42.88 29.00 42.88 29.00 42.88 40.75 5.50 61.75 93.88 94.88 95.88	7.19 0.75 0.13 -1.63 4.50 0.75  UP 3.2 0.00 0.63 2.88 2.50 -0.50 0.06 0.06 0.01 1.13 0.13 0.88 UP 1.2 1.13 -0.31 1.38 1.50 1.25 -0.88 0.00 -0.5 0.06 0.01 0.00 -0.175	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 -2.1 0.4 14.3 4.4 0.9 13.5 39% 2.8 -5.4 7.2 6.0 4.7 -2.1 0.4 14.3 -6.0 -1.6 -6.7 -1.1 -2.0 0.0 -1.6	APCC ADPT CBEX CREAF RACE DTM EMC EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  SEG COC CHRZ CSC TSK CPU COAT EGGS INAC INEL KEA MICA MICA MICA INEL KEA MICA MICA MICA MICA INEL KEA MICA MICA MICA MICA MICA MICA MICA MIC
GATE HWP MUEI NIPNY SGI SUNW  LAIT  AM H OGN OEC IBM MDCD NETF SQNT SEQS SRA TOM UIS  AOBE AANSWA AAPLX ARSW AOSK BGSS BMOSL BORL BOBL BORL BOBL CAYN CNTR CYE COGNF CA CVN CNTR CYPWR CSRE COGNF CA CVN CNTR CH CH CSRE COST FILE FTPS HUMGE FTPS HUMGE IFMS INGR	60.38 57.75 23.50 67.38 38.75 70.25 13.50 19.13 76.50 166.00 20.25 6.50 17.63 5.88 35.00 15.25 9.13 42.50 82.75 44.25 26.25 46.75 32.75 44.25 27.13 42.50 82.75 44.25 26.25 46.75 32.75 44.25 26.25 46.75 39.13 30.6	18.00 36.88 8.75 49.88 17.88 8.75 49.88 3.13 36.00 28.38 83.13 10.13 18.50 2.38 16.63 8.38 16.63 8.38 18.63 18.13 21.00 26.38 18.63 18.13 21.00 26.38 18.13 21.00 26.31 11.13 33.88 28.50 28.50 28.50 3.63 18.13 21.00 26.31 11.13 33.88 28.50 2	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATA INC. NETFRAME SEQUENT COMPUTER SYS. SEQUENT COMPUTER SINC. STRATUS COMPUTER INC. TANDEM COMPUTER SINC. UNISYS CORP.  ADOBE SYSTEMS INC. AMERICAN SOFTWARE INC. APPLIX INC. ABBOR SOFTWARE INC. BUSS SYSTEMS INC. (H) BMC SOFTWARE INC. BUSS SYSTEMS INC. (H) BMC SOFTWARE INC. BUSINESS OBJECTS CAYENNE SOFTWARE INC. CONDOIS INC. (H) COMPUTER ASSOCIATES COMPUTER VISION CORP. COMPUTER SISTEMS INC. (L) FILENET CORP. COMSHARE INC. COREL CORP. OATAWARE TECHNOLOGIES INC. (L) FILENET CORP. COMSTWARE INC. HUMMINGBIRO COMM. LTD. HYPERION SOFTWARE CORP INFORMATION RESOURCES INFORMIX CORP. INTERCRAPH CORP	60.38 54.88 18.88 60.25 24.00 58.00 11.75 11.75 15.00 39.00 156.75 7.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 18.00 19.	7.19 0.75 0.13 -1.63 4.50 0.75  UP 3.2 0.00 -0.63 2.88 2.50 -0.06 0.06 0.01 1.13 0.13 1.38 1.50 -0.25 -0.88 0.00 -0.81 -0.25 -0.88 0.00 -0.81 -0.25 -0.88 0.00 -0.81 -0.25 -0.88 -0.06 -0.13 0.00 -0.13 0.00 -0.13 0.00 -1.75	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 -2.1 0.4 14.3 4.4 0.9 13.5 39% 2.8 -5.4 7.2 6.0 4.7 -1.1 -2.0 -0.0 -1.4 -3.7 -1.1 -2.0 -0.0 -1.6 -6.7 -2.1 0.4 14.3 -4.3 -4.7 -1.1 -2.0 -0.0 -1.6 -0.7 -1.1 -0.0 -1.6 -0.7 -1.1 -0.0 -1.6 -0.7 -1.1 -0.0 -1.6 -0.7 -1.1 -0.0 -1.6 -0.7 -1.1 -0.0 -1.6 -0.7 -1.1 -0.0 -1.6 -0.7 -1.1 -0.0 -1.6 -0.7 -1.1 -0.0 -1.6 -0.7 -1.1 -0.0 -1.6 -0.7 -1.1 -0.0 -1.6 -0.0 -1.6 -0.7 -1.1 -0.0 -1.6 -0.0 -1.6 -0.0 -1.6 -0.0 -1.6 -0.0 -1.6 -0.0 -1.6 -0.0 -1.6 -0.0 -1.6 -0.0 -1.4 -1.7 -1.1 -0.0 -1.4 -1.7 -1.1 -1.0 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.2 -1.0 -1.4 -1.0 -1.2	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  AMSY ANLY AUD BOMI CATP CEN COO CHRZ CSC TSK CPU COAT EGGS EOS INACC INEL KEA MICA PAYX PMS PAYX PMS PAYX PMS
AOBE AMSWA AOSK BOOL BOOL SON CYT CYE COONF CYN CYT CYE COSFF OWTI FILE FITS WING RELEASE ISLI IN CORN IN CREATER IN CORN IN C	60.38 57.75 23.50 67.38 38.75 70.25 13.50 19.13 76.50 16.600 20.25 6.50 17.63 5.88 35.00 15.25 9.13 24.25 42.50 21.25 52.50 21.25 55.50 11.88 13.63 39.50 13.63 39.50 14.25 26.25 55.50 17.63 82.75 83.80 83.9	18.00 36.88 8.75 49.88 17.88 8.75 49.88 83.13 6.50 28.38 83.13 6.50 28.50 3.63 83.83 10.13 11.88 83.88 18.13 21.00 18.50 18.50 18.50 18.50 18.50 18.50 18.50 18.50 18.50 18.50 18.50 19.75 6.56 6.56 3.13 3.38 8.63 14.13 11.11 33.88 5.75 6.56 6.56 3.13 3.00 9.75 6.56 8.63 2.00 9.75	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAIL CORP. OATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATA INC. NET FRAME SEQUENT COMPUTER SYS. SEQUENT COMPUTER SYS. SEQUENT SYSTEMS INC. TANDEM COMPUTERS INC. UNISYS CORP.  ADOBE SYSTEMS INC. AMERICAN SOFTWARE INC. ARBOR SOFTWARE (L) AUTO DESK INC. BOOLE AND BABBAGE BORLAND INT'L INC. BUSINESS OBJECTS CATENNE SOFTWARE INC. COMPUTER ASSOCIATES COMPUTER VISION CORP. COMPUTER ASSOCIATES COMPUTER VISION CORP. COMPUTER ASSOCIATES COMPUTER SOFTWARE INC. COCORD. COMPUTER ASSOCIATES COMPUTER VISION CORP. COMPUTER ASSOCIATES COMPUTER VISION CORP. COMPUTER SOFTWARE INC. COREL CORP. OATAWARE TECHNOLOGIES INC. (L) FUENET CORP. FORTE SOFTWARE FITP. FORTE SOFTWARE FOR SOFTWARE FITP SOFTWARE INC. HUMMINGBIRD COMM. LTD. HYPERION SOFTWARE CORP. INTERGRAPH CORP.	60.38 54.88 60.25 24.00 58.00 11.75 15.00 39.00 156.75 7.00 25.00 14.00 7.38 17.00 42.88 29.00 7.38 15.00 12.00 4.28 29.00 7.38 15.00 12.00 4.28 29.00 7.38 15.00 12.00 4.28 29.00 7.38 15.00 12.00 4.28 29.00 7.38 15.00 12.0	7.19 0.75 0.13 -1.63 4.50 0.75  UP 3.2 0.00 0.63 2.88 2.50 -0.06 0.06 0.01 1.13 0.13 0.88  UP 1.2 1.13 -0.31 1.38 1.50 1.25 0.25 0.26 0.06 0.01 0.01 0.00 0.10 0.00 0.10 0.00 0.10 0.	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 -2.1 0.4 14.3 4.4 0.9 13.5 39% 2.8 -5.4 7.2 -6.0 4.7 -1.1 -2.0 0.9 8.0 -1.6 -6.7 -1.1 -2.1 0.4 14.3 -6.0 -1.6 -6.7 -1.1 -1.6 -6.0 -1.6 -6.7 -1.1 -1.6 -6.0 -1.6 -6.7 -1.1 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -1.6 -1.0	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  SEC AMSY ANLY AUD BOMI CATP CEN COO CCHRZ CSC TSK CPU COAT EGGS EOS INAC INEL KEA MICA PAYS PMS REY SCEI CSC TSK CPU COAT EGGS EOS INAC INEL KEA MICA PAYS PMS REY SCEI SEIC
GATE HWP MUEI NIPNY SGI SUNW  AMH OGN OEC IBM MDCD NETF SQNT SEQS TOM UIS  AOBE AMSWA AOSK BMOL BORL BORL BORL BORL BORL BORL BORL BO	60.38 57.75 23.50 67.38 38.75 70.25 70.25 13.50 19.13 76.50 166.00 20.25 6.50 17.63 5.88 35.00 15.25 9.13 42.5 7.13 42.5 7.13 42.5 46.75 32.50 11.88 7.13 30.63 39.50 11.88 15.50 11.88 15.50 11.88 15.50 11.88 15.50 11.88 15.50 11.88 15.50 11.88 15.50 11.88 15.50 11.88 15.50 16.60 17.63 18.60 18.75 18.	18.00 36.88 8.75 49.88 17.88 8.75 49.88 10.13 10	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATAINC. NETFRAME SEQUENT COMPUTER SYS. SEQUOIA SYSTEMS INC. STRATUS COMPUTER INC. TANDEM COMPUTERS INC. UNISYS CORP.  ADOBE SYSTEMS INC. AMERICAN SOFTWARE INC. AMERICAN SOFTWARE INC. ABODE SYSTEMS INC. (H) BMC SOFTWARE INC. BUSINESS OBJECTS CAYENNE SOFTWARE INC. BUSINESS OBJECTS CAYENNE SOFTWARE INC. CONDUTER ASSOCIATES COMPUTERVISION CORP. COMPUTER SOFTWARE INC. COMPUTER SOFTWARE INC. CONDUTER SOFTWARE INC. COMPUTER SOFTWARE CORP. COMPUTER SOFTWARE CORP. INTERCRAPH CORP. INTER	60.38 54.88 18.88 60.25 24.00 58.00 11.75 15.00 39.00 156.75 7.00 26.50 14.00 7.38 17.00 22.88 17.00 26.50 14.00 42.53 12.00 12.00 42.83 12.00 1	7.19 0.75 0.13 -1.63 4.50 0.75 0.03 -1.63 4.50 0.75 0.06 0.63 2.88 2.50 -0.50 -0.50 -0.66 0.31 1.13 0.13 0.88 1.50 1.13 -0.31 1.13 0.31 1.38 1.50 1.25 -0.88 0.00 -0.81 -0.25 -0.88 0.00 -0.13	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 -2.1 0.4 14.4 0.9 13.5 39% 2.8 -5.4 7.2 6.0 4.7 1.1 -2.0 0.0 9.8 -2.0 -1.4 4.4 -3.7 0.0 -1.6 -6.7 1.1 -2.0 0.0 -1.6 -6.7 1.1 -2.0 0.0 -1.6 -6.7 -1.1 -2.0 0.0 -1.6 -6.7 -1.1 -2.0 0.0 -1.6 -6.7 -1.1 -2.0 0.0 -1.1 -2.0 0.0 -1.1 -2.0 0.0 -1.1 -2.0 0.0 -1.1 -2.0 0.0 -1.1 -2.0 0.0 -1.1 -2.0 0.0 -1.1 -2.0 0.0 -1.1 -2.0 0.0 -1.1 -2.0 -1.1 -3.7 0.0 -1.4 -1.0 -2.0 -1.4 -1.0 -2.0 -1.4 -1.0 -2.0 -1.1 -2.0 -1.1 -3.7 0.0 -1.4 -1.0 -3.7 0.0 -1.4 -1.0 -3.7 0.0 -2.4 -1.0 -3.7 0.0 -3.7 0.0 -3.7 0.0 -3.7 0.0 -3.7 0.0 -3.7 0.0 -3.7 0.0 -3.6 -3.7 0.0 -3.6 -3.7 0.0 -3.6 -3.7 0.0 -3.6 -3.7 0.0 -3.6 -3.7 0.0 -3.6 -3.7 0.0 -3.6 -3.7 0.0 -3.6 -3.7 0.0 -3.6 -3.7 0.0 -3.6 -3.7 0.0 -3.6 -3.7 0.0 -3.6 -3.7 0.0 -3.6 -3.7 0.0 -3.6 -3.7 0.0 -3.6 -3.7 0.0 -3.7 0.0 -3.7 0.0 -3.7 0.0 -3.7 0.0 -3.7 0.0 -3.7 0.0 -3.7 0.0 -3.6 -3.7 0.0 -3.6 -3.7 0.0 -3.6 -3.7 0.0 -3.6 -3.0	APCC ADPT CBEX CREAF RACE DTM EMC EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  SEC CO CHRZ CSC TSK CPU COAT EGGS EOS INAC INEL KEA MICA PAYX PMS REY SCBI
GATE HWP MUEI NIPNY SGI SUNW  AMH OGN OEC IBM MDCD NETF SQNT SSOI  AOBE AADLW AOSK ACVN CNTR CYE COGNF CA CVN CNTR CYN COGNF CA CVN CNTR CYN COGNF CA CVN CNTR CYN CHR CSRE FTPS HUMGE FTPS HUMGE IFITS INTU	60.38 57.75 23.50 67.38 38.75 70.25 13.50 19.13 76.50 166.00 20.25 6.50 17.63 5.88 35.00 15.25 9.13 42.50 82.75 44.25 71.13 42.50 82.75 44.25 71.13 30.63 39.50 20.21 25.55.50 21.25 25.00 25.00 26.00 27.00 2	18.00 36.88 8.75 49.88 17.88 8.75 49.88 83.13 10.13 1.850 2.38 16.63 8.38 16.63 8.38 18.63 11.00 26.38 18.63 11.00 26.38 18.63 18.73 21.00 26.38 18.63 18.73 21.00 26.38 18.63 18.73 21.00 26.38 28.50	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATA INC. NETFRAME SEQUENT COMPUTER SYS. SEQUENT COMPUTER SYS. SEQUENT COMPUTER SINC. STRATUS COMPUTER INC. TANDEM COMPUTER SINC. UNISYS CORP.  ADOBE SYSTEMS INC. AMERICAN SOFTWARE INC. APPLIX INC. BUSINESS OBJECTS CAYENNE SOFTWARE INC. BUSINESS OBJECTS CAYENNE SOFTWARE INC. CUNTURA SOFTWARE CHEYENNE SOFTWARE INC. CONDUTER ASSOCIATES COMPUTER VISION CORP. COMPUTER ASSOCIATES COMPUTER SOFTWARE INC. HUMMINGBIRD COMM. LTD. HYPERION SOFTWARE CORP INFORMATION RESOURCES INFORMATION RESOURCES INFORMATION RESOURCES INFORMATION RESOURCES INFORMATION RESOURCES INFORMATION.	60.38 54.88 18.88 60.25 24.00 58.00 11.75 11.75 15.00 39.00 156.75 7.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 2.88 17.00 18.	7.19 0.75 0.13 -1.63 4.50 0.75 0.75 0.03 2.88 2.50 -0.06 0.06 0.06 0.01 1.13 0.13 1.38 1.50 1.25 0.88 0.00 0.81 0.25 0.88 0.00 0.81 0.25 0.88 0.00 0.81 0.25 0.88 0.00 0.17 0.18 0.25 0.88 0.00 0.18 0.25 0.88 0.00 0.18 0.25 0.88 0.00 0.18 0.25 0.88 0.00 0.18 0.25 0.88 0.00 0.18 0.25 0.88 0.00 0.18 0.25 0.88 0.00 0.18 0.25 0.88 0.00 0.18 0.25 0.88 0.00 0.18 0.25 0.88 0.00 0.18 0.25 0.88 0.00 0.18 0.25 0.88 0.00 0.19 0.38 0.25 0.38 0.00 0.19 0.38 0.25 0.38 0.00 0.19 0.38 0.00 0.19 0.38 0.00 0.19 0.38 0.00 0.10 0.00	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 -2.1 0.4 14.3 4.4 0.9 13.5 39% 2.8 -5.4 7.2 6.0 4.7 -1.1 -2.0 -0.0 -1.4 -3.7 -1.1 -2.0 -0.0 -1.4 -1.1 -0.0 -1.5 -0.7 -1.1 -0.0 -1.5 -0.7 -1.1 -0.0 -1.5 -0.7 -1.1 -0.0 -1.5 -0.7 -1.1 -0.0 -1.5 -0.7 -1.1 -0.0 -1.5 -0.7 -1.1 -0.0 -1.5 -0.0 -1.5 -0.0 -1.5 -0.0 -1.5 -0.0 -1.5 -0.0 -1.5 -0.0 -1.5 -0.0 -1.5 -0.0 -1.5 -0.0 -1.5 -0.0 -1.5 -0.0 -1.5 -0.0 -1.5 -0.0 -1.4 -1.7 -1.1 -0.0 -1.4 -1.7 -1.1 -0.0 -1.4 -1.7 -1.1 -0.0 -1.4 -1.7 -1.1 -0.0 -1.4 -1.7 -1.1 -1.0 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.4 -1.0 -1.2 -1.0 -1.4 -1.0 -1.2 -1.0 -1.2 -1.0 -1.2 -1.0 -1.	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  AMSY ANLY AUD BOMI CATP CEN COO CHRZ CSC TSK CPU COAT INAL ECGS EOS INAC INEL KEA MICA PAYX PMS SEG EOS INAC ECGS EOS EOS INAC ECGS EOS EOS INAC ECGS EOS EOS INAC ECGS EOS EOS ECS ECS ECS ECS ECS ECS ECS ECS ECS EC
AOBE AMSWA AOSK BOOL BOOL SERVING CONFICE CONF	60.38 57.75 23.50 67.38 38.75 70.25 13.50 166.00 17.63 17.650 17.63 18.80 15.25 17.63 18.80 15.25 17.63 18.80 18.00 15.25 17.63 18.00 15.25 17.63 18.00	18.00 36.88 8.75 49.88 17.88 8.75 49.88 10.13 10.13 10.13 10.13 10.13 10.13 10.13 10.13 10.13 10.13 10.13 10.13 10.13 10.13 10.10 11.86 10.13 10.13 10.13 10.13 10.10 10.13 10.13 10.13 10.13 10.10 10.13 10	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATAINC. NETFRAME SEQUENT COMPUTER SYS. SEQUOIA SYSTEMS INC. STRATUS COMPUTER INC. TANDEM COMPUTERS INC. UNISYS CORP.  ADOBE SYSTEMS INC. AMERICAN SOFTWARE INC. AMERICAN SOFTWARE INC. ABBOR 5 OFTWARE (L) AUTO DESK INC. BUSINESS OBJECTS CAYENNE SOFTWARE INC. BUSINESS OBJECTS CAYENNE SOFTWARE INC. CONDUTER ASSOCIATES COMPUTERVISION CORP. COMPUTER SOFTWARE INC. CONDUTER SOFTWARE INC. CONDUTER SOFTWARE INC. COMPUTER SOFTWARE INC. HUMMINGBIRD COMM. LTD. HYPERION SOFTWARE CORP. INTERCRAPH CO	60.38   54.88   18.88   60.25   24.00   58.00   11.75   15.00   39.00   156.75   7.00   2.88   17.00   2.88   17.00   2.88   2.9.00   2.7.75   5.50   26.50   12.00   4.2.88   29.00   7.38   11.70   2.81   3.25   30.38   31.50   20.00   20.00   3.25   30.38   31.50   20.00   20.00   3.25   30.38   31.50   20.77   5.50	7.19 0.75 0.13 -1.63 4.50 0.75 0.00 0.63 2.88 2.50 0.05 0.06 0.06 0.01 1.13 0.13 0.13 0.88 1.50 1.25 0.88 0.00 0.05 0.06 0.01 1.13 0.13 0.13 0.13 0.13 0.13 0.13	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 -2.1 0.4 14.3 4.4 0.9 13.5 39% 2.8 -5.4 7.2 0.0 4.7 -1.1 -2.0 0.0 -3.8 -3.4 -4.7 -1.1 -2.0 0.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.6 -6.0 -1.1 -1.0	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI ISLS FEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  SEC AMSY ANLY AUD BOMI CATP CCO CHREZ CSC TSK CPU COAT EGGS EOS INAC INEL KEA MICA PAYX PMS REY SCEI SMEO SSPE
GATE HWP MUEI NIPNY SGI SUNW  LAIT  AM H OGN OEC IBM MDCD NETF SQNT SEQS SRA TOM UIS  AOBE AMSWA AOSK BOSS BMOSL BORL BOSS BMOSL BORL BOSS BMOSL BORL CYGNF CA CVN CNTR CYGNF CA CVN CNTR CYGNF CA CVN CNTR CYGNF CA CVN CSRE FRTPS HUMCF HYSW IICI IFMS MATH MCAF MENT	60.38 57.75 23.50 67.38 38.75 70.25 13.50 19.13 19.13 176.50 166.00 20.25 6.50 17.63 5.88 35.00 15.25 44.25 74.25 74.25 74.25 44.25 46.75 32.50 82.75 44.25 46.75 32.50 82.75 44.25 65.00 11.88 11.88 15.50 67.88 15.50 16.25 36.75 20.13 20.27 20	18.00 36.88 8.75 49.88 17.88 8.75 49.88 83.13 10.13 11.60 28.38 83.13 10.13 11.85 10.13 11.85 11.86 11.85 11.86 11.85 11.86 11.85 11.86 11.85 11.86 11.85 11.86 11.85 11.86 11.85 11.86 11.85 11	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATA INC. NETFRAME SEQUENT COMPUTER SYS. SEQUOIA SYSTEMS INC. STRATUS COMPUTER INC. TANDEM COMPUTER SINC. UNISYS CORP.  ADOBE SYSTEMS INC. ABBOR SOFTWARE INC. BUSINESS OBJECTS CAYENNE SOFTWARE INC. BUSINESS OBJECTS CAYENNE SOFTWARE INC. CENTURA SOFTWARE INC. CONNOS INC. (H) COM PUTER ASSOCIATES COMPUTER VISION CORP. COMPUTER ASSOCIATES COMPUTER SINC. HUMMINGBIRD COMM. LTD. HYPERION SOFTWARE CORP. INFORMATION RESOURCES INFORMATION. HUMMINGBIRD COMM. LTD. HYPERION SOFTWARE CORP. INFORMATION RESOURCES INFORMIX CORP. INTERCRAPA INC. HUMMINGBIRD COMM. LTD. HYPERION SOFTWARE CORP. INTERCRAPA INC. HUMMINGBIRD COMM. LTD. HYPERION SOFTWARE CORP. INTERCRAPA HOR. INTERCRAPA INC. HUMMINGBIRD COMM. LTD. HYPERION SOFTWARE CORP. INTERCRAPA HOR. INTERCRAP	60.38 54.88 18.88 60.25 24.00 58.00 11.75 15.00 39.00 156.75 7.50 26.50 26.50 26.50 26.50 26.50 26.50 14.00 7.38 12.00 7.50 12.00 7.	7.19 0.75 0.13 -1.63 4.50 0.75 0.03 -1.63 4.50 0.75 0.06 0.63 2.88 2.50 -0.50 -0.66 0.06 0.01 1.13 0.13 1.13 0.13 1.13 0.13 1.13 0.13 1.13 0.13 1.13 0.13 1.13 0.13 1.13 0.13 1.13 0.13 1.13 0.13 1.13 0.13 1.13 0.13 1.13 0.13 1.13 0.13 1.13 0.13 1.13 0.13 0	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 1.1 -2.0 0.9 13.5 39% 2.8 -5.4 7.2 6.0 4.7 7.1 1.2 0.0 9.8 -2.0 1.4 4.3 7.0 0.9 13.5 7.1 4.6 0.0 -1.4 9.5 7.7 1.4 6.0 0.5 6.9 12.8 2.0 0.5 6.9 12.8 2.0 0.5 6.9 12.8 2.0 0.5 6.9 12.8 2.0 0.5 6.9 12.8 2.0 0.5 6.9 12.8 2.0 9.8 3.7 9.7 0.0 4.0 4.0 3.7 0.0 2.2 8.0 1.0 0.5 6.9 12.8 2.0 9.2 8.3 3.7 9.7 0.0 4.0 4.0 3.7 0.0 4.0 4.0 3.0 0.5 6.9 12.8 2.0 9.8 3.3 9.0 0.2 8.0 1.0 0.2 8.0 1.0 0.2 8.0 1.0 0.2 8.0 1.0 0.2 8.0 1.0 0.2 8.0 1.0 0.2 8.0 1.0 0.2 8.0 1.0 0.2 8.0 0.0 2.2 8.0	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI ISLS FEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  SEC AMSY ANLY AUD BOMI CATP CCO CHREZ CSC TSK CPU COAT EGGS EOS INAC INEL KEA MICA PAYX PMS REY SCEI SMEO SSPE
AM HOGOLO METERS AM SWA APLY ARSW AOSK BOOL BORL BOBY CAYN CYE COGNE CYN CYE COSFE COSFE OWTI FILE FRTE FTPS WIRIC LEAR SWA APLY AND CAYN CYE COSFE COSFE COSFE COMPANIE CYE CYE CYE CYE CYE CYE CYE CYE CYE CY	60.38 57.75 23.50 67.38 38.75 70.25 13.50 19.13 70.25 16.50 16.60 20.25 6.50 17.63 5.88 35.00 15.25 9.13 24.25 26.25 74.25 42.50 21.25 25.50 25.50 26.25 27.50	18.00 36.88 8.75 49.88 17.88 8.75 49.88 83.13 6.50 28.38 83.13 16.50 28.50 3.63 83.83 10.13 1.88 83.83 10.13 1.88 83.83 10.13 1.88 83.83 10.13 1.88 83.83 10.13 1.88 83.83 10.13 1.88 18.13 10.00 18.5	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATAINC. NETFAAME SEQUENT COMPUTER SYS. SEQUENT COMPUTER SYS. SEQUENT COMPUTER SINC. STRATUS COMPUTER SINC. UNISYS CORP.  ADOBE SYSTEMS INC. AMERICAN SOFTWARE INC. APPLIX INC. ABBOR SOFTWARE (L) AUTO DESK INC. BUS SYSTEMS INC. (H) BMC SOFTWARE (L) BOS SYSTEMS INC. (H) BMC SOFTWARE INC. BOOLE AND BABBAGE BORLAND INT'L INC. BUSINESS OBJECTS CAYENNE SOFTWARE CHYENNE SOFTWARE INC. CONDUTER ASSOCIATES COMPUTER ASSOCIATES COMPUTER SOFTWARE INC. COREL CORP. OATAWARE TECHNOLOGIES INC. (L) FILENET CORP. OATAWARE TO THE SOURCES INFORMIX CORP. INTERGRAPH C	60.38 54.88 18.88 60.25 24.00 58.00 11.75 15.00 39.00 156.75 7.00 2.88 17.00 2.65.00 26.50 14.00 7.38 26.50 20.50 26.50 14.00 7.38 26.50 20.50 26.50 14.00 7.38 26.50 14.00 7.50 12.00 7.50 7.50 7.50 7.50 7.50 7.50 7.50 7	7.19 0.75 0.13 1.63 4.50 0.75 0.75 0.03 2.88 2.50 0.06 0.06 0.06 0.06 0.01 1.13 0.13 1.38 1.50 0.25 0.25 0.80 0.06 0.13 0.25 0.81 0.25 0.81 0.25 0.81 0.25 0.81 0.25 0.81 0.25 0.81 0.25 0.81 0.25 0.83 0.00 0.81 0.13 0.00 0.81 0.25 0.81 0.25 0.83 0.00 0.81 0.25 0.83 0.00 0.81 0.25 0.83 0.00 0.81 0.25 0.83 0.00 0.93 0.93 0.93 0.93 0.93 0.93 0.9	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 8.0 -1.6 -6.7 -2.1 0.4 14.3 4.4 0.9 13.5 39% 2.8 -5.4 7.2 0.0 4.7 -1.1 -2.0 0.0 -9.8 -2.0 -1.4 -3.7 -1.1 4.6 0.0 -1.4 -9.5 -7.8 20.9 12.8 0.0 -1.4 -10.3 6.9 12.8 0.0 -1.4 -10.3 6.9 12.8 0.0 -1.4 -10.3 6.9 12.8 0.0 -2.4 -10.3 0.0 -2.4 -10.3 0.0 -2.4 -10.3 0.0 -2.4 -10.3 0.0 -2.4 -10.3 0.0 -2.4 -10.3 0.0 -2.4 -10.3 0.0 -2.4 -10.3 0.0 -2.4 -10.3 0.0 -2.4 -10.3 0.0 -2.4 -10.3 0.0 -2.4 -10.3 0.0 -2.4 -10.3 0.0 -2.4 -10.3 0.0 -2.4 -10.3 0.0 -2.4 -10.3 0.0 -2.4 -10.3 0.0 -2.4 -10.3 0.0 -2.4 -10.3 0.0 -	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC WOC XRX  ANLY AUD BOMI CATP CCO CHRE COO CHRE CSC TSK CPU COAT EGGS EOS INAC INEL KEA MICA PAYX PMS SEC SMEO SSPE STIC SMEO SMEO STIC SMEO SMEO SMEO SMEO SMEO SMEO SMEO SMEO
AOBE AMSWA AOSK BOOL BOOL SET CONTROL	60.38 57.75 23.50 67.38 38.75 70.25 13.50 166.00 20.25 6.50 17.63 5.88 35.00 15.25 9.13 24.25 74.25 74.25 74.25 74.25 74.25 74.25 74.25 74.25 74.25 74.25 74.25 74.25 74.25 74.25 74.25 76.50 82.75 83.80 83.80 83.80 83.75 84.15 86.100	18.00 36.88 8.75 49.88 17.88 8.75 49.88 83.13 6.00 28.38 83.13 6.50 8.38 10.13 11.00 18.50	GATEWAY 2000 INC. (H) HEWLETT PACKARD CO. MICRON INTERNATIONAL INC. NEC AMERICA SILICON GRAPHICS SUN MICROSYSTEMS INC.  AMDAHL CORP. OATA GENERAL CORP. OIGITAL EQUIPMENT CORP. IBM (H) MERIDIAN OATAINC. NETFRAME SEQUENT COMPUTER SYS. SEQUENT SYSTEMS INC. STRATUS COMPUTER INC. TANDEM COMPUTERS INC. UNISYS CORP.  AODBE SYSTEMS INC. AMBRICAN SOFTWARE INC. APPLIX INC. ABBOR SOFTWARE (L) AUTO DESK INC. BOLE AND BABBAGE BORLAND INT'L INC. BUSINESS OBJECTS CATENNE SOFTWARE INC. CONTURA SOFTWARE INC. CONTURA SOFTWARE INC. CONDUTERVISION CORP. COMPUTERVISION CORP. COMPUTERVISION CORP. COMPUTER SOTTWARE INC. CORP. OATAWARE TECHNOLOGIES INC. (L) FILENET CORP. FORTE SOTTWARE LOT COMPUTER SOFTWARE FTP SOFTWARE INC. HUMMINGBIRD COMM. LTD. HYPERION SOFTWARE SOFTWARE SOFTWARE INC. HUMMINGBIRD COMM. LTD. HYPERION SOFTWARE CORP INTERCEAP INC. INTERICATED INC. INTUITINC. LEARNING CO (THE) LOGIC WORKS MAPINFO CORP MATHSOFT MCAFEE ASSOCIATES MENTOR GRAPHICS MICRO FOCUS	60.38 54.88 18.88 60.25 24.00 58.00 11.75 15.00 39.00 156.75 5.50 26.50 14.00 7.38 29.00 12.00 4.28 29.00 7.38 11.50 12.00 12.00 4.25 30.38 31.50 12.00 29.75 25.19 9.88 2.77 25.19 9.88 6.88 6.88 6.88 6.88 6.88 6.88 6.8	7.19 0.75 0.13 -1.63 4.50 0.75 0.00 0.63 2.88 2.50 0.00 0.63 2.88 2.50 0.00 0.63 1.13 0.13 0.13 0.88 1.50 0.25 0.88 0.00 0.63 1.025 0.88 0.00 0.125 0.88 0.00 0.131 0.132 0.31 0.31 0.31 0.31 0.31 0.31 0.31 0.31	1.4 0.7 -2.6 23.1 1.3 22% 0.0 4.3 0.0 1.6 -6.7 -2.1 0.4 14.3 0.9 13.5 39% 2.8 -5.4 7.2 6.0 4.7 -2.1 0.0 4.3 -3.1 1.3 3.0 -1.6 -6.7 -1.1 -2.0 0.0 4.4 4.4 0.9 13.5 -3.1	APCC ADPT CBEX CREAF RACE DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI ISTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  SEC AMSY ANLY AUD BOMI CATP CCO CHREZ CSC TSK CPU COAT EGGS EOS INAC INEL KEA MICA PAYS PMS REY SCEI SMEO SSPEC VST SNOT

2 25

PEOPLESOFT (H)
PHOENIX TECHNOLOGIES
PLATINUM SOFTWARE
PLATINUM TECHNOLOGY
PROGRESS SOFTWARE CORP.

	3183	38.30	13.30	SYBASE INC.	1938	1 63	9 2
	SYMC SNPS	28.75	8 75 27.50	SYMANTEC CORP.	14.88 45.50	0.56 0.75	3.9 1.7
	SSAX	50.50 26.75	8 25	SYNOPSYS SYSTEM SOFTWARE ASSOC.	13.13	-0.75	-5.4
	SYSF	36.50	4 38	SYSTEMSOFT CORP.	17.13	-1 00	-5 5
	TRUV	9.63	2.50	TRUEVISION CORP	3.25	0.50	18 2
	VIEW	17.50	8 38	VIEWLOGIC SYSTEMS	10 25	0.50	5 1
	VMRK	12.63	5.50	VMARK SOFTWARE INC.	7 25	-0.38	49
	WALK	15.63	6.25	WALKERINTERACTIVE SYSTEMS (H)	14 44	-0.56	-3 8
	WALL	27.50 26 13	12.25 15 38	WALL OATAINC. WANG LABORATORIES INC.	14 50 20 63	-0.63	0.0
	WAITE	20 17	13 30	WANG ENDORATORIES INC.	1007	-0.05	- /
	Inte	rnet			- 1	JP 11.4	19%
	AOL	71.00	22.38	AMERICA ON-LINE	39 38	4 13	11.7
	BBN	48.75	15.63	BBN CORP.	22.50	-0 63	-2.7
	CSRV	35.50	8 63	COMPUSERVE CORP	12 63	2.50	24.7
	EOFY	55.75	13 38	EDIFY CORP. (L)	16.88	3.38	25 0
	LCOS	29.25	5.75	Lycos Inc.	13.38	2.63	24 4
	NETC NSCP	73.50 87.00	12.50 34 50	NETCOM ON-LINE NETSCAPE COMM CORP	17.00 57.69	0.13 2.69	0.7 4.9
	OMKT	42.25	11.50	OPEN MARKET INC.	16 63	2.25	15.7
	PSIX	29.00	6.75	PSINET	12 50	-0.50	-3.8
	QOEK	39 50	3 94	QUARTERDECK CORP.	5 38	-0 44	-7.5
	RAPT	39.25	12.75	RAPTOR SYSTEMS	21.75	-0.75	-3.3
	SCUR SPYG	64.50	7.75 10.00	SECURE COMPUTING CORP.  SPYGLASS INC.	9 13 16.38	0.13 6.00	1 4 57 8
	YHOO	43.00	15.50	YAHOO! INC.	21.00	2.25	12 0
	-	-					
	Sen	Heond	luctor	5 2		UP 5.0	37%
	AMO	25.88		ADVANCED MICRO DEVICES	25.50	1.00	4.1
	ADI	35.38	17.00	ANALOG OEVICES INC. (H)	32.75	1 50	4.8
	CHPS	26.50 29.50	8.00 12.63	CHIPS AND TECHNOLOGIES CIRRUS LOGIC	21 88 19 50	7 69 -0 13	8 4 -0.6
	CY	16.25	9.13	CYPRESS SEMICONDUCTOR CORP	13.50	1.00	8 0
	CYRX	36.50	11.50	CYRIX	19.50	0.88	4.7
	INTC	129.63	49.81	INTEL CORP (H)	126.38	0.00	0 0
	LSI	48.00	17.00	LSI LOGIC CORP.	30.38	0.13	0.4
	LSCC	47.00	19.75	LATTICE SEMICONDUCTOR (H)	44 38	0.00	0.0
	MCRL MU	30.75 69.38	12.00 16.63	MICREL SEMICONDUCTORING. (H) MICRON TECHNOLOGY	28.75 33.38	3 88 0.13	15 6 0.4
	MOT	68.50	44.13	MOTOROLAINC.	54.25	-0.75	-1.4
п	NSM	27.00	13.00	NATIONAL SEMICONDUCTOR (H)	2700	2.50	102
9	TXN	67.75	40.50	TEXAS INSTRUMENTS (H)	64 00	1.00	16
	VLSI	26.50	10.38	VLSI TECHNOLOGY (H)	26.50	3.63	15 8
	XLNX ZLG	46.50 40.38	23.25 14.88	ZILINX ZILOGÍNC.	43 25 25.50	-0.75 3.50	.1 7 15.9
	210	40.30	14.00	ZILOGINC.	23.30	3.30	13.3
	Peri	iphera	is and	Subsystems		UP 3.6	54%
	APCC	25.75	7.88	AMERICAN POWER CONVERSION (H)	24.50	0 13	0.5
	ADPT	41.13	17.50	ADAPTECING (H)	37.38	0.13	0.3
	CBEX	8.75	2 25	CAMBEX CORP	2.38	-0.13	-5 0
	CREAF RACE	11.50 17.25	3.50 3.75	CREATIVE TECHNOLOGY LTD.  DATA RACE INC. (H)	8 75 15.63	2.81 3.50	47 4 28 9
2				OATARAM CORP.	7.50	-0 13	-1.6
i	DTM EMC	8 63 33.13	4.13 15.13	OATARAM CORP. EMC CORP. (H)			-1.6 3.0
i	DTM EMC EMLX	8 63 33.13 21.38	4.13 15.13 6.38	EMC CORP. (H) EMULEX CORP.	7.50 30.50 17.00	-0 13 0 88 1.00	3.0 6.3
ĺ	DTM EMC EMLX ESCC	8 63 33.13 21.38 29.00	4.13 15.13 6.38 19.00	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND	7.50 30.50 17.00 24.25	-0 13 0 88 1.00 -1.00	3.0 6.3 -4.0
i	DTM EMC EMLX ESCC EXBT	8 63 33.13 21.38 29.00 22.75	4.13 15.13 6.38 19.00 11.63	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE	7.50 30.50 17.00 24.25 16.63	-0 13 0 88 1.00 -1.00 2.38	3.0 6.3 -4.0 16.7
i	DTM EMC EMLX ESCC EXBT IISLF	8 63 33.13 21.38 29.00 22.75 4.13	4.13 15.13 6.38 19.00	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND	7.50 30.50 17.00 24.25	-0 13 0 88 1.00 -1.00	3.0 6.3 -4.0
i	DTM EMC EMLX ESCC EXBT	8 63 33.13 21.38 29.00 22.75	4.13 15.13 6.38 19.00 11.63 1.38	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABSTE EXABSTE INTELLIGENT INFO. SYSTEMS	7.50 30.50 17.00 24.25 16.63 1.75	-0 13 0 88 1.00 -1.00 2.38 0 25	3.0 6.3 -4.0 16.7 16.7
1	DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG	8 63 33.13 21.38 29.00 22.75 4.13 55.13 8.25 37.00	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT (NFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC	7.50 30.50 17.00 24.25 16.63 1.75 23.50 2.00 33.75	-0 13 0 88 1.00 -1.00 2.38 0 25 1 50 0.06 1.75	3.0 6.3 -4 0 16 7 16.7 6 8 3 2 5.5
1	DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI	8 63 33.13 21.38 29.00 22.75 4.13 55.13 8.25 37.00 26.38	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT INFO. SYSTEMS IOMEGA CORP IPL SYSTEM SINC KOMAG INC MICRO TOUCH SYSTEMS INC. (H)	7.50 30.50 17.00 24.25 16.63 1.75 23.50 2.00 33.75 25.00	-0 13 0 88 1.00 -1.00 2.38 0 25 1 50 0.06 1.75 0.38	3.0 6.3 -4 0 16 7 16.7 6 8 3 2 5.5 1.5
1	DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK	8 63 33.13 21.38 29.00 22.75 4.13 55.13 8.25 37.00 26.38 34.75	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT INFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOCY GROUP	7.50 30.50 17.00 24.25 16.63 1.75 23.50 2.00 33.75 25.00 11.75	-0 13 0 88 1.00 -1.00 2.38 0 25 1 50 0.06 1.75 0.38 0.50	3.0 6.3 -4 0 16 7 16.7 6 8 3 2 5.5 1.5 4 4
1	DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK PNCL	8 63 33.13 21.38 29.00 22.75 4.13 55.13 8.25 37.00 26.38 34.75 19.63	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLICENT INPO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOGY GROUP PINNACLE MICRO INC.	7.50 30.50 17.00 24.25 16.63 1.75 23.50 2.00 33.75 25.00	-0 13 0 88 1.00 -1.00 2.38 0 25 1 50 0.06 1.75 0.38	3.0 6.3 -4 0 16 7 16.7 6 8 3 2 5.5 1.5
1	DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK	8 63 33.13 21.38 29.00 22.75 4.13 55.13 8.25 37.00 26.38 34.75	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT INFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOCY GROUP	7.50 30.50 17.00 24.25 16.63 1.75 23.50 2.00 33.75 25.00 11.75 4.88	0 13 0 88 1.00 1.00 2.38 0 25 1 50 0.06 1.75 0.38 0.50 0.69 0.00 2.50	3.0 6.3 -4.0 16.7 16.7 6.8 3.2 5.5 1.5 4.4 -12.4 0.0 9.4
	DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK PNCL QNTM ROUS	8 63 33.13 21.38 29.00 22.75 4.13 55.13 8.25 37.00 26.38 34.75 19.63 6.75 29.38 4.88	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88 3.75 10.88 0.44	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLICENT INFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC. KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOCY GROUP PINNACLE MICRO INC. QMS INC QUANTUM CORP. (H) RADIUS INC.	7.50 30.50 17.00 24.25 16.63 1.75 23.50 2.00 33.75 25.00 11.75 4.88 5.88 29.00 0.63	-0 13 0 88 1.00 -1.00 2.38 0 25 1 50 0.06 1.75 0.38 0.50 0.69 0.00 2.50 -0.19	3.0 6.3 -4.0 16.7 16.7 6.8 3.2 5.5 1.5 4.4 -12.4 0.0 9.4 -23.1
	DTM EMC EMLX ESCC EXBT IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG	8 63 33.13 21.38 29.00 22.75 4.13 55.13 8.25 37.00 26.38 34 75 19.63 6.75 29.38 4.88 42.75	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88 3.75 10.88 0.44	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT INFO. SYSTEMS IOMEGA CORP IPL SYSTEM SINC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOGY GROUP PINNACLE MICRO INC. QMS INC QUANTUM CORP (H) RADIUS INC SEAGATE TECHNOLOGY (H)	7.50 30.50 17.00 24.25 16.63 1.75 23.50 2.00 33.75 25.00 11.75 4.88 5.88 29.00 0.63 40.25	0 13 0 88 1.00 1.00 2.38 0 25 1 50 0.06 1.75 0.38 0.50 0.69 0.00 2.50	3.0 6.3 -4.0 16.7 16.7 6.8 3.2 5.5 1.5 4.4 -12.4 0.0 9.4 -23.1 3.2
	DTM EMC EMCX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK	8 63 33.13 21.38 29.00 22.75 4.13 55.13 8.25 37.00 26.38 34 75 19.63 6.75 29.38 4.88 42.75 52.00	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88 3.75 10.88 0.44 18.13 22.00	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT INFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC. KOMAC INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOCY GROUP PINNACLE MICRO INC. QMS INC QUANTUM CORP (H) RADIUS INC SEACATE TECHNOLOCY (H) STORAGE TECHNOLOCY	7.50 30.50 17.00 24.25 16.63 1.75 23.50 2.00 33.75 25.00 11.75 4.88 5.88 29.00 0.63 40.25 48.25	-0 13 0 88 1.00 1.00 2.38 0 25 1 50 0.06 1.75 0.38 0.50 0.69 0.00 2.50 0 19 1 25 0.00	3.0 6.3 4.0 16.7 16.7 6.8 3.2 5.5 1.5 4.4 -12.4 0.0 9.4 -23.1 3.2 0.0
	DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC	8 63 33.13 21.38 29.00 22.75 4.13 55.13 8.25 37.00 26.38 4.75 19.63 6.75 29.38 4.88 42.75 20.00 8.75	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88 3.75 10.88 0.44 18.13 22.00 0.75	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT INFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC. KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOCY GROUP PINNACLE MICRO INC. QMS INC QUANTUM CORP (H) RADIUS INC SEACATE TECHNOLOCY (H) STORAGE TECHNOLOCY STREAMLOGIC CORP	7.50 30.50 17.00 24.25 16.63 1.75 23.50 2.00 33.75 25.00 11.75 4.88 5.88 29.00 0.63 40.25	0 13 0 88 1.00 1.00 2.38 0 25 1 50 0.06 1.75 0.38 0.50 0.69 0.00 2.50 0.19 1 25 0.00	3.0 6.3 -4.0 16.7 16.7 6.8 3.2 5.5 1.5 4.4 -12.4 0.0 9.4 -23.1 3.2
	DTM EMC EMCX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK	8 63 33.13 21.38 29.00 22.75 4.13 55.13 8.25 37.00 26.38 34 75 19.63 6.75 29.38 4.88 42.75 52.00	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88 3.75 10.88 3.75 10.84 18.13 22.00 0.75 29.75	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT INFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC. KOMAC INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOCY GROUP PINNACLE MICRO INC. QMS INC QUANTUM CORP (H) RADIUS INC SEACATE TECHNOLOCY (H) STORAGE TECHNOLOCY	7.50 30.50 17.00 24.25 16.63 1.75 23.50 2.00 11.75 4.88 5.88 29.00 0.63 40.25 48.25 1.00 50.25 58.38	0 13 0 88 1 1.00 2 .38 0 25 1 50 0 .06 1 .75 0 .38 0 .50 0 .06 9 0 .00 2 .50 0 19 1 25 0 .00 0 .04 2 13 4 75	3.0 6.3 -4.0 16.7 6.8 3.2 5.5 4.4 -12.4 0.0 9.4 -23.1 3.2 0.0 -30.4 4.4 8.9
	DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK PNCL QNTM ROUS SEG STK STLC TEK	8 63 33.13 21.38 29.00 22.75 4.13 55.13 8.25 37.00 26.38 34.75 19.63 6.75 29.38 4.88 42.75 52.00 8.75 57.38	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88 3.75 10.88 0.44 18.13 22.00 0.75 29.75	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT ÍNFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOGY GROUP PINNACLE MICRO INC. QUANTUM CORP (H) RADIUS INC SACATE TECHNOLOGY (H) STORAGE TECHNOLOGY STREAMLOGIC CORP TEXTRONUS INC.	7.50 30.50 17.00 24.25 16.63 1.75 23.50 2.00 33.75 25.00 11.75 4.88 5.88 29.00 0.63 40.25 48.25 1.00 50.25	0 13 0 88 1.00 1.00 2.38 0 25 1 50 0.06 1.75 0.38 0.50 0.69 0.00 2.50 0.00 0.44 2 13	3.0 6.3 40 7 16.7 6.8 3.2 5.5 1.5 4.4 4.23.1 3.2 0.0 -30.4 4.4
	DTM EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM ROUS SEG STK STLC TEK WOC XRX	8 63 33.13 21.38 29.00 22.75 4.13 55.13 8.25 37.00 26.38 34.75 19.63 6.75 29.38 4.88 42.75 52.00 8.75 57.38 60.13	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88 3.75 10.88 0.44 18.13 22.00 0.75 29.75	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT INFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC. KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOGY GROUP PINNACLE MICRO INC. QUANTUM CORP (H) RADIUS INC. SEAGATE TECHNOLOGY (H) STORAGE TECHNOLOGY STREAMLOGIC CORP TEXTRONIX INC.	7.50 30.50 17.00 24.25 16.63 1.75 23.50 2.00 33.75 25.00 11.75 4.88 29.00 0.63 40.25 48.25 1.00 50.25 58.38 59.88	0 13 0 88 1 1.00 2 .38 0 25 1 50 0 .06 1 .75 0 .38 0 .50 0 .06 9 0 .00 2 .50 0 19 1 25 0 .00 0 .04 2 13 4 75	3.0 6.3 -4.0 16.7 16.7 6.8 3.2 5.5 1.5 4.4 -12.4 0.0 9.4 -23.1 3.2 0.0 -30.4 4.4 8.9 9.4
	DTM EMC EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK TEK WOC XRX  SET'  AMSY	8 63 33.13 21.38 29.00 22.75 4.13 8.25 37.00 26.38 34.75 19.63 6.75 29.38 4.88 42.75 52.00 8.75 57.38 60.13 58.25	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88 3.75 10.88 0.44 18.13 22.00 0.75 29.75 15.75 39.88	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT INFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC. KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOGY GROUP PINNACLE MICRO INC. QUANTUM CORP (H) RADIUS INC. SEAGATE TECHNOLOGY (H) STORAGE TECHNOLOGY STREAMLOGIC CORP TEXTRONIX INC.	7.50 30.50 17.00 24.25 16.63 1.75 23.50 2.00 33.75 25.00 11.75 4.88 5.88 29.00 0.63 40.25 48.25 1.00 50.25 58.38 50.88	-0 13 0 88 1.00 -1.00 2.38 0.25 1.50 0.06 1.75 0.38 0.50 0.69 0.00 2.50 0.00 2.50 0.00 -1.75 0.00 0.00 -1.75 0.00 0.00 -1.75 0.00 -1.75 0.00 -1.75 0.00 -1.75 0.00 -1.75	3.0 6.3 40 16.7 16.7 6.8 3.2 5.5 1.5 1.2 4 0.0 9.4 4.23.1 3.2 0.0 30.4 4.4 8.9 4.1 8.9 4.1 8.9 4.1 8.9 8.9 8.9 8.9 8.9 8.9 8.9 8.9 8.9 8.9
	DTM EMC EMLX ESCC EXBT IOM IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  AMSY ANLY	8 63 33.13 21.38 29.00 22.75 4.13 55.13 8.25 37.00 26.38 34.75 19.63 6.75 29.38 4.88 42.75 52.00 8.75 57.38 60.13 58.25	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88 3.75 10.88 0.44 18.13 22.00 0.75 29.75 39.88	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT INFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOGY GROUP PINNACLE MICRO INC. QUANTUM CORP (H) RADIUS INC SACCATE TECHNOLOGY (H) STORAGE TECHNOLOGY STREAMLOGIC CORP TEXTRONIX INC. WESTERN DIGITAL CORP. (H) XEROX CORP.  AMERICAN MGMT SYSTEMS (H) ANALYSTS INT'L (H)	7.50 30.50 17.00 24.25 16.63 1.75 23.50 2.00 33.75 25.00 11.75 4.88 29.00 0.63 40.25 1.00 50.25 8.88 50.88	-0 13 0 88 1.00 -1.00 2.38 0 25 1 50 0.00 -0.38 0.50 0.09 0.00 -0.19 1 25 0.00 -0.44 2 13 4 75 2.00	3.0 6.3 4.0 16.7 16.7 6.8 3.2 5.5 4.4 4.12.4 0.0 9.4 23.1 3.2 0.0 30.4 4.8 9.4 1.3 4.8 9.4 1.3 9.4 1.3 9.4 9.4 9.4 9.4 9.4 9.4 9.4 9.4 9.4 9.4
	DTM EMC EMCX ESCC EXBT IOM IPLS FINA MTSI PEAK PNCL AQM QNTM ROUS SEG STK WOC XRX  SET  AMSY ANLY AUD	8 63 33.13 21.38 29.00 22.75 4.13 55.13 8.25 37.00 26.38 34.75 19.63 6.75 29.38 42.75 52.00 8.75 57.38 60.13 58.25 57.38 60.13 58.25 57.38 60.13 58.25 57.38 60.13 58.25	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 14.88 3.75 10.88 3.75 10.89 10.44 18.13 22.00 0.75 29.75 15.75 39.88	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT INFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAR TECHNOLOCY GROUP PINNACLE MICRO INC. QMS INC QUANTUM CORP (H) RADIUS INC SEAGATE TECHNOLOCY STREAMLOGIC CORP TEXTRONIX INC. WESTERN DIGITAL CORP. (H) XEROX CORP.	7.50 30.50 24.25 16.63 1.70 20.00 33.75 25.00 11.75 4.88 29.00 0.63 48.25 1.00 50.25 50.25 50.25 50.25 50.25 50.25 50.25 50.25 50.25 50.25 50.25 50.25 60.25	-0 13 0 88 1.00 -1.00 2.38 0.50 0.06 0.38 0.50 0.09 0.00 2.50 0.00 2.51 2.00 0.04 2.13 4.75 2.00 -0.04 2.13 4.75 2.00 -0.06 -	3.0 6.3 16.7 16.7 16.7 6.8 3.2 5.5 1.5 1.2 4 0.0 9.4 -23.1 3.2 0.0 -30.4 4.4 4.9 4.1 3.8 4.1 4.1 4.1 4.1 5.5 6.3 6.3 6.3 6.3 6.3 6.3 6.3 6.3 6.3 6.3
	DTM EMC EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK WOC XRX  SET  AMSY ANLY BOMI	8 63 33.13 29.00 22.75 55.13 8.25 55.13 8.25 56.38 34.75 52.00 6.75 29.38 42.75 52.00 57.38 60.13 58.25 57.38 60.13 58.25	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88 3.75 10.88 0.44 18.13 22.00 0.75 29.75 15.75 39.88	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT ÍNPO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOGY GROUP PINNACLE MICRO INC. QUANTUM CORP (H) RADIUS INC SCACATE TECHNOLOGY STREAMLOGIC CORP TEXTRONIX INC. WESTERN DIGITAL CORP. (H) XEROX CORP.  AMERICAN MGMT SYSTEMS (H) ANALYSTS INT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC	7.50 30.50 17.00 24.25 16.63 1.75 23.50 2.00 11.75 25.00 11.75 25.00 11.75 48.25 88.38 40.25 48.25 58.88 29.00 00.25 58.38 40.25 48.25 50.88	-0 13 0 88 1.00 -1.00 2.38 0 25 1 50 0.06 1.75 0.38 0.50 0.69 0.00 2.50 0.12 0.00 -0.19 1 25 0.00 -0.44 2 13 4 75 2.00 FF O.8	3.0 6.3 4.0 16.7 16.7 16.7 6.8 3.2 5.5 4.4 12.4 0.0 9.4 23.1 3.2 0.0 30.4 4.4 8.9 4.1 1 3.8 9.4 1 3.8 9.4 1 3.9 4.1 1 3.9 4.1 1 3.9 4.1 1 3.9 4.1 1 3.9 4.1 1 3.9 4.1 1 3.9 4.1 1 3.9 4.1 1 3.9 4.1 1 3.9 4.1 1 3.9 4.1 4.1 4.1 4.1 4.1 4.1 4.1 4.1 4.1 4.1
	DTM EMC EMLX ESCC EXBT IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  SET AMSY ANLY AUD BOMI CATP	8 63 33 13 32 138 29 00 22.75 4.13 55.13 70 00 26.38 8.25 37.00 26.38 4.75 19.63 6.75 57.38 42.75 57.38 25.00 8.75 57.38 25.00 8.75 57.38 25.00 8.75 57.38 25.00 8.75 57.38 6.15 50 6.13 58 25	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88 3.75 10.88 0.44 18.13 22.00 0.75 29.75 29.75 39.88	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT INFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOGY GROUP PINNACLE MICRO INC. QUANTUM CORP (H) RADIUS INC SACCATE TECHNOLOGY STREAMLOGIC CORP TEXTRONIK INC. WESTERN DIGITAL CORP. (H) XEROX CORP.  AMERICAN MGMT SYSTEMS (H) ANALYSTS INT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC CAMBRIDGE TECH PARTNERS	7.50 30.50 24.25 16.63 1.70 20.00 33.75 25.00 11.75 4.88 29.00 0.63 48.25 1.00 50.25 50.25 50.25 50.25 50.25 50.25 50.25 50.25 50.25 50.25 50.25 50.25 60.25	-0 13 0 88 1.00 -1.00 2.38 0.50 0.06 0.38 0.50 0.09 0.00 2.50 0.00 2.51 2.00 0.04 2.13 4.75 2.00 -0.04 2.13 4.75 2.00 -0.06 -	3.0 6.3 16.7 16.7 16.7 6.8 3.2 5.5 1.5 1.2 4 0.0 9.4 -23.1 3.2 0.0 -30.4 4.4 4.9 4.1 3.8 4.1 4.1 4.1 4.1 5.5 6.3 6.3 6.3 6.3 6.3 6.3 6.3 6.3 6.3 6.3
	DTM EMC EMC EMLX ESCC EXBT IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK WOC XRX  SET  AMSY ANLY BOMI	8 63 33.13 29.00 22.75 55.13 8.25 55.13 8.25 56.38 34.75 52.00 6.75 29.38 42.75 52.00 57.38 60.13 58.25 57.38 60.13 58.25	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 14.88 3.75 10.88 0.44 18.13 22.00 0.75 29.75 15.75 39.88	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT ÍNPO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOGY GROUP PINNACLE MICRO INC. QUANTUM CORP (H) RADIUS INC SCACATE TECHNOLOGY STREAMLOGIC CORP TEXTRONIX INC. WESTERN DIGITAL CORP. (H) XEROX CORP.  AMERICAN MGMT SYSTEMS (H) ANALYSTS INT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC	7,50 30,50 17,00 24,25 16,63 1,70 23,50 23,50 23,50 20,00 33,75 25,00 0,63 40,25 48,25 58,88 29,00 0,63 40,25 48,25 58,88 48,25 58,88 48,25 58,88 48,25 58,88 48,25 58,88 48,25 58,88 48,25 58,88 48,25 58,88 58,8	-0 13 0 88 1.00 -1.00 2.38 0.25 1.50 0.06 0.00 -0.19 1.25 0.00 -0.44 2.13 4.75 2.00 	3.0 6.3 4.0 16.7 16.7 16.7 6.8 3.2 5.5 4.4 12.4 0.0 9.4 23.1 3.2 0.0 30.4 4.8 9.4 1.3 4.8 9.4 1.3 9.4 1.3 9.4 1.3 9.4 1.3 9.4 1.3 9.4 1.3 9.4 1.3 9.4 9.4 9.4 9.4 9.4 9.4 9.4 9.4 9.4 9.4
	DTM EMC EMCX ESCC EXBT IOM IPLS ISLF IOMS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  SET' AMSY ANLY ANLY BOMI CATP CEN	8 63 33.13 221.38 29.00 22.75 4.13 55.13 8.25 6.38 34.75 29.38 42.75 57.38 60.81 37.13 28.25 57.38 60.81 37.7.25 54.88	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88 3.75 10.88 0.44 18.13 22.00 0.75 29.75 13.63 34.88 25.44 13.88 36.63 19.88 36.63 19.88	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT INFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOCY GROUP PINNACLE MICRO INC. QMS INC QUANTUM CORP (H) RADIUS INC SEAGATE TECHNOLOCY (H) STORAGE TECHNOLOCY STREAMGOGIC CORP TEXTRONIX INC. WESTERN OIGITAL CORP. (H) XEROX CORP.  AMERICAN MGMT SYSTEMS (H) ANALYSTS INT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC CAMBRIDGE TECH PARTNERS CERIDIAN CORP. COMBUSCO INC COMPUTER HORIZONS	7,50 30,50 17,00 24,25 16,63 1,72 23,50 23,50 23,50 25,00 0,63 40,25 48,	-0 13 0 88 1.00 -1.00 2.38 0.25 1.50 0.06 0.00 0.09 0.00 0.19 1.25 0.00 0.44 2.13 4.75 2.00 	3.0 6.3 4.0 16.7 16.7 16.7 6.8 3.2 5.5 4.4 12.4 0.0 9.4 23.1 3.2 0.0 30.4 4.4 8.9 4.1 3.3 9.4 1.3 9.4 1.3 9.4 1.3 9.4 1.3 9.4 1.3 9.4 1.3 9.4 1.3 9.4 1.3 9.4 1.3 9.4 9.4 9.4 9.4 9.4 9.4 9.4 9.4 9.4 9.4
	DTM EMC EMCX ESCC EXBT IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK WOC XRX  SET' AMSY ANLY ANLY BOMI CATP CEN COO CHRZ CSC	8 63 33.13 221.38 29.00 22.75 4.13 55.13 8.25 6.38 34.75 57.38 60.81 37.00 26.38 37.00 26.38 34.75 57.38 60.81 37.70 57.38 60.81 37.70 57.38 60.81 37.70 57.38 60.81 37.70 57.38 60.81 37.70 61.50 61.	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 22.00 0.75 29.75 15.75 39.88 25.44 13.88 25.44 13.88 25.44 13.88 25.44 13.88 25.44 13.88 25.44 13.88 25.44 13.88 25.44 13.88 25.44 13.88 26.63 19.88 15.00 64.13	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT ÍNFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAR TECHNOLOGY GROUP PINNACLE MICRO INC. QMS INC QUANTUM CORP (H) RADIUS INC SEAGATE TECHNOLOGY STREAMLOGIC CORP TEXTRONIX INC. WESTERN DIGITAL CORP. (H) XEROX CORP.  AMERICAN MGMT SYSTEMS (H) ANALYSTS INT'L (H) ANALYSTS INT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC CAMBRIDGE TECH PARTNERS CERIOLAN CORP. COMPUTER HORIZONS COMPUTER HORIZONS	7,50 30,50 17,00 24,25 16,63 1,75 23,50 2,00 31,75 25,00 11,75 58,8 58,8 58,8 58,6 1,00 50,25 58,38 8,00 1,00 50,25 58,38 8,27,38 48,27 48	-0 13 0 88 1.00 -1.00 2.38 0.50 0.06 0.06 0.00 2.50 0.00 0.17 1.25 0.00 0.44 2.13 4.75 2.00 -1.88 -3.06 -2.25 1.88 -3.06 -2.25 1.188 -3.06 -3.188 -3.06 -3.188 -3.06 -3.188 -3.06 -3.188 -3.06 -	3.0 6.3 4.0 16.7 16.7 16.7 6.8 3.2 5.5 4.4 4.1 23.1 3.2 0.0 30.4 4.4 8.9 4.1 3.8 5.9 2.2 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 4.1 4.1 5.9 4.1 5.9 5.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6
	DTM EMC EMLX ESCC EXBT IOM IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM ROUS SEG STK STLC TEK WOC XRX  SET' AMSY ANLY AUD BOMI CATP CEN COO CHRZ CSC TSK	8 63 33 13 21.38 29 00 22.75 4.13 55.13 70 00 26.38 8.25 37.00 26.38 4.88 42.75 29.38 46.03 58.25 20 00 8.75 7.38 50.03 37.25 54.88 33.00 54.00 55.00 54.00 54.00 54.00 54.00 54.00 54.00 54.00 54.00 54.00 54.00 55.00 54.00 55.00 54.00 54.00 54.00 55.00 54.00 54.00 54.00 54.00 55.00 54.00 54.00 54.00 55.00 54.00 54.00 55.00 54.00 54.00 55.00 54.00 55.00	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88 3.75 10.88 0.44 18.13 22.00 0.75 29.75 39.88	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT ÍNPO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOGY GROUP PINNACLE MICRO INC. QUANTUM CORP (H) RADIUS INC SACATE TECHNOLOGY STREAMLOGIC CORP TEXTRONIX INC. WESTERN DIGITAL CORP. (H) XEROX CORP.  AMERICAN MGMT SYSTEMS (H) ANALYSTS INT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC CAMBRIDGE TECH PARTNERS CERIDIAN CORP, COMDISCO INC COMPUTER HORIZONS COMPUTER FOIENCES COMPUTER TASK GROUP	7,50 30,50 17,00 24,25 16,63 1,75 23,50 2,00 33,75 25,00 0 63 40,25 4 88 27,38 41,13 45,63 41,13 45,63 41,13 45,63 41,13 45,63 41,13 45,63 45,13 46,13 47,13 48,13	-0 13 0 88 1.00 1.00 2.38 0 25 1 50 0.06 0.00 0.00 0.00 0.00 0.00 0.00 0.44 2 13 4 75 2.00 FF Q & 1.75 1.7	3.0 6.3 4.0 16.7 16.7 16.7 6.8 3.2 5.5 4.4 1.2 4.0 9.4 1.3 2.0 0.0 3.0 4.4 8.9 4.1 3.2 0.0 3.3 4.4 8.9 4.1 1.3 9.4 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3
	DTM EMC EMLX ESCC EXBT IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STLC TEK WOC XRX  SET  AMSY AUD BOMI CATP CEN COO CHRZ CSC TSK	8 63 33 13 21.38 29 00 22.75 4.13 55.13 8.25 7.00 26.38 4.75 19.63 6.75 57.38 4.88 42.75 57.38 42.75 57.38 43.50 45.75 54.88 37.13 58.25	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 10	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT INFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOCY GROUP PINNACLE MICRO INC. QMS INC QUANTUM CORP (H) RADIUS INC SEAGATE TECHNOLOCY STREAMLOGIC ORP TEXTRONIX INC. WESTERN OIGITAL CORP. (H) XEROX CORP.  AMERICAN MGMT SYSTEMS (H) ANALYSTS INT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC CAMBRIDGE TECH PARTNERS CERIDIAN CORP. COMPUTER HORIZONS COMPUTER HORIZONS COMPUTER FIGHERS COMPUTER TASK GROUP COMPUTER TASK GROUP	7,50 30,50 17,00 24,25 16,63 31,75 23,50 2,00 33,75 25,00 11,75 4,88 5,88 40,20 40,25 48,2	-0 13 0 88 1.00 .1.00 .2.38 0.25 1 50 0.06 0.00 .2.50 2.50 2.50 2.50 2.50 2.50 2.5	3.0 6.3 4.0 16.7 16.7 16.8 3.2 5.5 1.5 4.4 1.2 2.0 0.0 9.4 1.2 3.2 0.0 3.2 0.0 4.4 4.8 9.4 1.3 9.4 1.3 9.4 1.3 9.4 1.3 9.4 1.3 9.4 1.3 1.3 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
	DTM EMC EMLX ESCC EXBT IOM IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM ROUS SEG STK STLC TEK WOC XRX  SET' AMSY ANLY AUD BOMI CATP CEN COO CHRZ CSC TSK	8 63 33 13 21.38 29 00 22.75 4.13 55.13 70 00 26.38 8.25 37.00 26.38 4.88 42.75 29.38 46.03 58.25 20 00 8.75 7.38 50.03 37.25 54.88 33.00 54.00 55.00 54.00 54.00 54.00 54.00 54.00 54.00 54.00 54.00 54.00 54.00 55.00 54.00 55.00 54.00 54.00 54.00 55.00 54.00 54.00 54.00 54.00 55.00 54.00 54.00 54.00 55.00 54.00 54.00 55.00 54.00 54.00 55.00 54.00 55.00	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 3.75 10.84 4.88 3.75 10.84 18.13 22.00 0.75 29.75 15.75 39.88 25.44 13.88 36.63 19.88 15.00 64.13 16.75 6.50 12.75	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT ÍNFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOGY GROUP PINNACLE MICRO INC. QUANTUM CORP (H) RADIUS INC SEAGATE TECHNOLOGY STREAMLOGIC CORP TEXTRONIX INC. WESTERN DIGITAL CORP. (H) XEROX CORP.  AMERICAN MOMT SYSTEMS (H) ANALYSTS INT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC CAMBRIDGE TECH PARTNERS CERIDIAN CORP. COMPUTER HORIZONS COMPUTER SCIENCES COMPUTER SCIENCES COMPUTER SCIENCES COMPUTER SCIENCES COMPUTER TASK GROUP CONTROL DATA SYSTEMS INC	7,50 30,50 17,00 24,25 16,63 1,75 23,50 2,00 33,75 25,00 0 63 40,25 4 88 27,38 41,13 45,63 41,13 45,63 41,13 45,63 41,13 45,63 41,13 45,63 45,13 46,13 47,13 48,13	-0 13 0 88 1.00 1.00 2.38 0 25 1 50 0.06 0.00 0.00 0.00 0.00 0.00 0.00 0.44 2 13 4 75 2.00 FF Q & 1.75 1.7	3.0 6.3 4.0 16.7 16.7 16.7 6.8 3.2 5.5 4.4 1.2 4.0 9.4 1.3 2.0 0.0 3.0 4.4 8.9 4.1 3.2 0.0 3.3 4.4 8.9 4.1 1.3 9.4 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3
	DTM EMC EMCX ESCC EXBT IOM IPLS FINA PEAK MAG MTSI PEAK PONCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  SET' AMSY ANLY ANLY ANLY BOMI CATP CEN COO CHRZ CTSK CPU COAT	8 63 33 13 21.38 29 00 22.75 4.13 55.13 70 02 63.38 4.75 19.63 6.75 57.38 4.88 42.75 57.38 45.75 57.38 57.75 57.75	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 3.75 10.84 4.88 3.75 10.84 18.13 22.00 0.75 29.75 15.75 39.88 25.44 13.88 36.63 19.88 15.00 64.13 16.75 6.50 12.75	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT ÍNFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOGY GROUP PINNACLE MICRO INC. QUANTUM CORP (H) RADIUS INC SEAGATE TECHNOLOGY STREAMLOGIC CORP TEXTRONIX INC. WESTERN DIGITAL CORP. (H) XEROX CORP.  AMERICAN MOMT SYSTEMS (H) ANALYSTS INT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC CAMBRIDGE TECH PARTNERS CERIDIAN CORP. COMPUTER HORIZONS COMPUTER SCIENCES COMPUTER SCIENCES COMPUTER SCIENCES COMPUTER SCIENCES COMPUTER TASK GROUP CONTROL DATA SYSTEMS INC	7,50 30,50 17,00 24,25 16,63 1,70 23,50 2,00 33,75 25,00 66,3 48,25 1,00 50,25 88,25 1,00 50,25 88,25 1,00 50,25 88,25 1,00 50,25 88,25 1,00 50,25 88,25 1,00 50,25 88,25 1,00 50,25 88,25 1,00 1,00 1,00 1,00 1,00 1,00 1,00 1,0	-0 13 0 88 1.00 .1.00 .2.38 0.50 0.06 0.00 2.50 0.00 2.50 0.00 .2.50 0.00 0.0	3.0 6.3 4.0 16.7 16.7 16.8 3.2 5.5 1.5 4.4 0.0 9.4 1.23.1 3.2 0.0 4.4 4.8 9.2 4.1 3.9 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0
	DTM EMC EMCX ESCC EXBT IOM IPLS ISLF IOM IPLS KMAG MTSI PEAK PACL AQM QNTM ROUS SEG STK TEK WOC XRX  SET'  AMSY ANLD BOMI CATP CEN COO CHRZ CSC TSK CPU COAT EGGS EOS EOS	8 63 33.13 221.38 29.00 22.75 13 8.25 57.38 60.13 77.25 57.38 60.13 77.25 54.88 33.00 88 28.61 13 88 28.66 13 88 38 50	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 10.13 22.00 0.75 29.75 15.75 39.88 25.44 13.88 25.44 13.88 25.44 13.88 25.44 13.88 25.44 13.88 15.00 64.13 16.75 6.50 17.75 6.50 17.75 18.80 19	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT ÍNFO. SYSTEMS IOMEGA CORP IPL SYSTEM SINC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAR TECHNOLOGY GROUP PINNACLE MICRO INC. QMS INC QUANTUM CORP (H) RADIUS INC SEAGATE TECHNOLOGY STREAMLOGIC CORP TEXTRONIX INC. WESTERN DIGITAL CORP. (H) XEROX CORP.  AMERICAN MGMT SYSTEMS (H) ANALYSTS INT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC CAMBRIDGE TECH PARTNERS CERIOLAN CORP. COMPUTER TASK GROUP COMPUTER TASK GROUP COMPUSA INC CONTROL OATA SYSTEMS INC EGGHEAD DISCOUNT SOFTWARE ELECTRONIC OATA SYSTEMS CORP INACOM CORP.	7.50 30.50 24.25 16.63 1,700 24.25 23.50 2.00 33.75 25.00 11.75 58.8 29.00 50.25 58.38 58.8 27.38 48.25 48.2	-0 13 0 88 1.00 -1.00 2.38 0.50 0.06 0.09 0.00 2.51 0.00 2.51 0.00 0.175 0.00 2.50 0.00 2.51 1.75 0.00 0.44 2.13 4.75 2.00 -1.88 3.06 -2.25 1.88 3.06 3.175 1.88 3.06 3.175 1.88 3.06 3.175 1.88 3.06 3.175 1.88 3.06 3.175 1.88 3.06 3.	3.0 6.3 4.0 16.7 16.7 16.8 3.2 5.5 4.4 12.4 0.0 9.4 1.3 2.2 0.0 30.4 4.4 8.9 4.1 3.2 0.3 4.4 8.9 4.1 3.2 0.3 4.4 4.7 3.3 9.2 9.2 9.4 1.3 9.4 1.3 9.4 1.3 9.4 1.3 9.6 9.6 9.6 9.6 9.6 9.6 9.6 9.6 9.6 9.6
	DTM EMC EMLX ESCC EXBT IOM IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  SET' AMSY ANLY AUD BOMI CATP CEN COO CHRZ CSC TSK CPU COAT INSL INAC INEL	8 63 33 13 32 138 29 00 22.75 4 4.13 55.13 4 75 19.63 6.75 57.38 4.25 57.38 57.55 57.55 57	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 1	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT ÍNFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOGY GROUP PINNACLE MICRO INC. QUANTUM CORP (H) RADIUS INC SAGATE TECHNOLOGY STREAMLOGIC CORP TEXTRONIX INC. WESTERN DIGITAL CORP. (H) XEROX CORP.  AMERICAN MGMT SYSTEMS (H) ANALYSTS INT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC CAMBRIDGE TECH PARTNERS CERIDIAN CORP. COMPUTER TASK GROUP COMPUTER TASK GROUP COMPUTS AINC CONTROL OATA SYSTEMS INC EGGHEAD DISCOUNT SOFTWARE ELECTRONIC OATA SYSTEMS CORP INACOM CORP INCELIGENT ELECTRONICS	7,50 30,50 30,50 30,50 30,50 30,50 31,75 23,50 20 20 33,75 25,00 00 33,88 27,13 45,63 34,11 21,38 27,13 46,88 36,00 00 36,0	-0 13 0 88 1.00 1.00 2.38 0.25 1.50 0.69 0.00 0.19 1.25 0.00 0.44 2.13 4.75 2.00 	3.0 6.3 4.0 16.7 16.7 16.8 3.2 5.5 4.4 12.4 0.0 9.4 23.1 3.2 0.0 30.4 4.8 9.4 1.1 3.2 0.0 30.4 4.8 9.4 1.3 1.5 4.1 4.1 4.1 4.1 4.1 4.1 4.1 4.1
	DTM EMC EMLX ESCC EXBT IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  SeT CATP CEN COO CORT COO CORT COO COO COO COO COO COO COO COO COO CO	8 63 33.13 21.38 29.00 22.75 4.13 55.13 7.00 26.38 4.88 42.75 57.38 4.88 42.75 57.38 4.88 42.75 55.13 61.50 8.75 57.38 25 40.8 82.75 54.00	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 1	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT (INFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAR TECHNOLOCY GROUP PINNACLE MICRO INC. QMS INC QUANTUM CORP (H) RADIUS INC SEAGATE TECHNOLOCY STREAMLOGIC ORP TEXTRONIX INC. WESTERN DIGITAL CORP. (H) XEROX CORP.  AMERICAN MGMT SYSTEMS (H) ANALYSTS INT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC CAMBRIDGE TECH PARTNERS CERIDIAN CORP. COMPUTER TASK GROUP COMPUTER TASK GROUP COMPUTER SCIENCES COMPUTER SCIENCES COMPUTER SCIENCES COMPUTER STASK GROUP COMPUSA INC CONTROL DATA SYSTEMS INC EGGHEAD DISCOUNT SOFTWARE ELECTRONIC OATA SYSTEMS CORP INTELLIGENT ELECTRONICS KLANEINC (H)	7,50 30,50 17,00 24,25 16,63 1,70 23,50 2,00 11,75 25,00 11,75 25,00 11,75 25,00 11,00 50,25 48,25 48,25 48,25 58,88 41,13 45,88 41,13 45,88 41,13 45,63 31,25 58,13 41,13 45,63 31,25 58,13 41,	-0 13 0 88 1.00 -1.00 2.38 0.50 0.06 0.09 0.00 2.51 0.00 2.51 0.00 0.175 0.00 2.50 0.00 2.51 1.75 0.00 0.44 2.13 4.75 2.00 -1.88 3.06 -2.25 1.88 3.06 3.175 1.88 3.06 3.175 1.88 3.06 3.175 1.88 3.06 3.175 1.88 3.06 3.175 1.88 3.06 3.	3.0 6.3 4.0 16.7 16.7 16.8 3.2 5.5 1.5 4.4 23.1 3.2 0.0 3.4 4.4 8.9 2.2 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 5.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6
	DTM EMC EMLX ESCC EXBT IOM IISLF IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  SET' AMSY ANLY AUD BOMI CATP CEN COO CHRZ CSC TSK CPU COAT INSL INAC INEL	8 63 33 13 32 138 29 00 22.75 4 4.13 55.13 4 75 19.63 6.75 57.38 4.25 57.38 57.55 57.38 58 57.38 58 57 57.38 58 57 57.38 58 57 57 57 57 57 57 57 57 57 57 57 57 57	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 125 10.13 125 10.13 125 10.13 10.44 18.13 22.00 0.75 29.75 15.75 39.88 25.44 13.88 25.44 13.88 25.44 13.88 15.00 64.13 16.75 6.50 17.50 1	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT ÍNFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOGY GROUP PINNACLE MICRO INC. QUANTUM CORP (H) RADIUS INC SAGATE TECHNOLOGY STREAMLOGIC CORP TEXTRONIX INC. WESTERN DIGITAL CORP. (H) XEROX CORP.  AMERICAN MGMT SYSTEMS (H) ANALYSTS INT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC CAMBRIDGE TECH PARTNERS CERIDIAN CORP. COMPUTER TASK GROUP COMPUTER TASK GROUP COMPUTS AINC CONTROL OATA SYSTEMS INC EGGHEAD DISCOUNT SOFTWARE ELECTRONIC OATA SYSTEMS CORP INACOM CORP INCELIGENT ELECTRONICS	7,50 30,50 30,50 30,50 30,50 30,50 31,75 23,50 20 20 33,75 25,00 00 33,88 27,13 45,63 34,11 21,38 27,13 46,88 36,00 00 36,0	-0 13 0 88 1.00 -1.00 2.38 0.50 0.06 1.75 0.38 0.50 0.00 2.50 0.00 2.50 0.00 2.50 0.00 2.50 0.00 2.50 0.00 2.50 0.00 2.50 0.00 2.50 0.00 2.50 0.00 2.50 0.00 2.50 0.00 2.50 0.00 2.50 0.00 2.50 0.00 2.50 0.00 2.50 0.00 0.00 2.50 0.00 0.00 2.50 0.00	3.0 6.3 4.0 16.7 16.7 16.8 3.2 5.5 4.4 12.4 0.0 9.4 23.1 3.2 0.0 30.4 4.8 9.4 1.1 3.2 0.0 30.4 4.8 9.4 1.3 1.5 4.1 4.1 4.1 4.1 4.1 4.1 4.1 4.1
	DTM EMC EMCX ESCC EXBT IOM IPLS FINA PEAK MAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK TEK WOC XRX  SET'  AMSY ANLD BOMI CATP CEN COO CHRZ CSC TSK CPU COOT EGGS EOS INAC INEL KEL KEL KEL KEL KEL KEL KEL KEL KEL K	8 63 33.13 221.38 29.00 22.75 13 8.25 57.38 60.13 77.25 57.38 60.13 77.25 57.38 60.13 77.25 61.50 61.50 61.38 82.56 61.50 61.50 61.38 82.66 61.38 83.30 60.13 60.1	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT (INFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAR TECHNOLOCY GROUP PINNACLE MICRO INC. QMS INC QUANTUM CORP (H) RADIUS INC SEAGATE TECHNOLOCY STREAMLOGIC ORP TEXTRONIX INC. WESTERN DIGITAL CORP. (H) XEROX CORP.  AMERICAN MGMT SYSTEMS (H) ANALYSTSINT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC CAMBRIOGE TECH PARTNERS CENIOLAN CORP. COMPUTER TASK GROUP COMPUTER TASK GROUP COMPUTER TASK GROUP COMPUTER TASK GROUP COMPUTER SCIENCES COMPUTER TASK GROUP INTELLIGENT TASK GROUP INTELLIGENT TELECTRONICS KLANEINC (H) MICROACE INC PAYCHEX POLICY MANAGEMENT SYS	7,50 30,50 24,25 16,63 1,70 23,50 23,50 20,00 11,75 25,50 11,75 25,50 11,75 25,00 11,75 25,00 11,00 50,25 88,25 88,29,00 50,25 88,25 88,29,00 10	-0 13 0 88 1.00 .1.00 .2.38 0.50 0.06 0.00 2.50 0.00 2.50 0.00 .44 2 13 4 75 2.00 FF 0.8 0.38 0.38 0.38 0.38 0.38 0.38 0.38	3.0 6.3 4.0 16.7 16.7 16.8 3.2 5.5 1.5 4.4 23.1 3.2 0.0 30.4 4.4 8.9 2.2 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 5.9 5.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6.9 6
	DTM EMC EMCX ESCC EXBT IOM IPLS ISLF IOM IPLS KMAG MTSI PEAK MONTM ROUS SEG STK WOC XRX  SET'  AMSY ANLD BOMI CATP CEN COO CHRZ CSC TSK CPU COOT EGGS EOS INAC INAC INEL MICA PAYX PAYS PMS REY	8 63 33.13 22.1.38 29.00 22.75 13 8.25	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 125 10.13 125 10.13 125 10.13 10.13 10.44 18.13 22.00 0.75 29.75 15.75 39.88 25.44 13.88 25.44 13.88 25.44 13.88 25.44 13.88 15.00 64.13 16.75 6.50 17.55 17.55 18.63 19.83 1	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT ÍNFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOGY GROUP PINNACLE MICRO INC. QUANTUM CORP (H) RADIUS INC SEAGATE TECHNOLOGY STREAMLOGIC CORP TEXTRONIX INC. WESTERN DIGITAL CORP. (H) XEROX CORP.  AMERICAN MGMT SYSTEMS (H) ANALYSTS INT'L (H) ANALYSTS INT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC CAMBRIDGE TECH PARTNERS CERICIAN CORP. COMPUTER HORIZONS COMPUTER SCIENCES COMPUTER TASK GROUP CONTROL DATA SYSTEMS INC EGGHEAD DISCOUNT SOFTWARE ELECTRONIC OATASYSTEMS CORP INTELLIGENT ELECTRONICS KLANEINC (H) MICROAGE INC PAYCHEX POLICY MANAGEMENT SYS REYNOLOS AND REYNOLOS	7,50 30,50 17,00 24,25 16,63 1,75 23,50 2,00 33,75 25,00 0 63 40,25 4 88 5 88 27,38 41,13 40,25 5 83,88 27,38 41,13 45,63 41,13 41,13 45,63 41,1	-0 13 0 88 1.00 1.00 2.38 0.25 1.50 0.06 0.00 0.00 0.00 0.00 0.00 0.00 0	3.0 6.3 4.0 16.7 16.7 16.8 3.2 5.5 4.4 12.4 0.0 9.4 1.3 2.2 0.0 30.4 4.4 8.9 4.1 3.2 0.0 30.4 4.4 8.9 4.1 4.7 3.5 9.2 2.7 4.1 4.7 3.5 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0 9.0
	DTM EMC EMLX ESCC EXBT IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STIC TEK WOC XRX  SET' AMSY ANLY AUD BOMI COO CHRZ CSC TSK CPU COAT COO CHRZ CSC INAC INEL KEA MICA MICA MICA PAYX PMS REY PMS REY PMS SCBI	8 63 38 38 55 55 50 50 50 50 50 50 50 50 50 50 50	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88 3.75 10.88 3.75 10.88 22.00 0.75 29.75 29.75 39.88 17.50 13.63 34.88 25.44 13.88 36.63 19.88 47.63 19.88 47.63 19.83 19.	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT ÍNFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOGY GROUP PINNACLE MICRO INC. QUANTUM CORP (H) RADIUS INC SAGATE TECHNOLOGY STREAMLOGIC CORP TEXTRONIX INC. WESTERN DIGITAL CORP. (H) XEROX CORP.  AMERICAN MGMT SYSTEMS (H) ANALYSTS INT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC CAMBRIDGE TECH PARTNERS CERIDIAN CORP COMPUTER TASK GROUP COMPUTER TASK GROUP COMPUTS GIENCES COMPUTER TASK GROUP COMPUTS AND INCELORATED TO THE STEMS CORP INACOM CORP INTELLIGENT ELECTRONICS KLANEINC (H) MICROAGEINC PAYCHEX POLICY MANAGEMENT SYS REYNOLDS AND REYNOLDS SCB COMPUTER TECH INC	7,50 30,50 11,75 16,63 1,75 23,50 20,00 33,75 25,00 0,63 40,25 48,85 88,88 27,13 45,63 31,75 45,63 46,75 47 47 48,75 48,	-0 13 0 88 1.00 .1.00 .2.38 0.25 1.50 0.06 0.00 .2.50 .0.00	3.0 6.3 4.0 16.7 16.7 16.8 3.2 5.5 1.5 4.4 1.2 1.0 1.0 1.3 1.0 1.3 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
	DTM EMC EMLX ESCC EXBT IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  SET CAMPY AUD BOMI CATP CEN COO CHRZ CSC TSK CPU COAT EGGS INAC INEL MICA PAYS REY SEIC	8 63 33 31 33 21.38 29.00 22.75 4.13 55.13 8.25 29.88 42.75 52.9 38 42.75 57.38 42.75 55.38 42.75 55.4 88 33.00 82.75 54.88 63 13.85 60 13 68.85 60 13	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 10.88 3.75 10.88 1	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT (INFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOCY GROUP PINNACLE MICRO INC. QMS INC QUANTUM CORP (H) RADIUS INC SEAGATE TECHNOLOCY STREAMLOGIC CORP TEKTRONIX INC. WESTERN DIGITAL CORP. (H) XEROX CORP.  AMERICAN MGMT SYSTEMS (H) ANALYSTS INT'L (H) ANALYSTS INT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC CAMBRIDGE TECH PARTNERS CERIDIAN CORP. COMPUTER TASK GROUP COMPUTER TASK GROUP COMPUTER SCIENCES COMPUTER TASK GROUP INTELLIGENT ELECTRONICS KLANE INC. KLANE INC. (H) MICROAGE INC PACHEK PACH PACHEK P	7,50 30,50 30,50 30,50 30,50 30,50 30,50 30,50 30,50 31,75 32,50 31,75 32,50 31,75 3	-0 13 0 88 1.00 -1.00 2.38 0.50 0.06 1.75 0.38 0.50 0.06 0.00 2.50 0.00 2.50 0.00 2.50 0.00 2.50 0.00 2.50 0.00 2.50 0.00 1 25 0.00 0.44 2 13 4 75 0.18 0.18 0.18 0.18 0.18 0.18 1 75 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18	3.0 6.3 4.0 16.7 16.7 16.8 3.2 0.0 9.4 1.23.1 3.2 0.0 30.4 4.4 8.9 1.2 4.1 3.2 0.3 1.3 1.3 1.4 1.4 1.2 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3
	DTM EMC EMLX ESCC EXBT IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STIC TEK WOC XRX  SET' AMSY ANLY AUD BOMI COO CHRZ CSC TSK CPU COAT COO CHRZ CSC INAC INEL KEA MICA MICA MICA PAYX PMS REY PMS REY PMS SCBI	8 63 38 38 55 55 50 50 50 50 50 50 50 50 50 50 50	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 11.25 10.13 4.88 3.75 10.88 0.44 18.13 22.00 0.75 29.75 39.88 17.50 13.63 34.88 25.44 13.88 36.63 19.88 15.00 64.13 19.63 19.75 19.	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT ÍNFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOGY GROUP PINNACLE MICRO INC. QUANTUM CORP (H) RADIUS INC SAGATE TECHNOLOGY STREAMLOGIC CORP TEXTRONIX INC. WESTERN DIGITAL CORP. (H) XEROX CORP.  AMERICAN MGMT SYSTEMS (H) ANALYSTS INT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC CAMBRIDGE TECH PARTNERS CERIDIAN CORP COMPUTER TASK GROUP COMPUTER TASK GROUP COMPUTS GIENCES COMPUTER TASK GROUP COMPUTS AND INCELORATED TO THE STEMS CORP INACOM CORP INTELLIGENT ELECTRONICS KLANEINC (H) MICROAGEINC PAYCHEX POLICY MANAGEMENT SYS REYNOLDS AND REYNOLDS SCB COMPUTER TECH INC	7,50 30,50 11,75 16,63 1,75 23,50 20,00 33,75 25,00 0,63 40,25 48,85 88,88 27,13 45,63 31,75 45,63 46,75 47 47 48,75 48,	-0 13 0 88 1.00 .1.00 .2.38 0.25 1.50 0.06 0.00 .2.50 .0.00	3.0 6.3 4.0 16.7 16.7 16.8 3.2 5.5 1.5 4.4 1.2 1.0 1.0 1.3 1.0 1.3 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
	DTM EMC EMLX ESCC EXBT IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STK STLC TEK WOC XRX  SET CATP CEN COO CORT CATP CEN COOT CHRZ CSC TSK CPU COAT EGGS INAC INEL MICA PAYS REY SEIC SMEO SSEE SSEE SSEE SSEE SSEE SSEE SSEE	8 63 33.13 22.1.38 29.00 22.75 4.13 55.13 8.25 5.13 8.25 6.75 29.38 42.75 55.83 57.38 58.25 57.38 61.50 8.75 54.88 33.00 82.75 54.88 33.00 82.75 54.88 61.13 88.85 61.13 88.85 61.13 88.85 61.13 88.85 61.13 88.85 61.13 88.85 61.13 88.85 61.13 88.85 61.13 88.75 55.50 61.13 88.85 61.13	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 3.75 10.88 10.88 3.75 10.88	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT (INFO. SYSTEMS IOMEGA CORP IPL SYSTEM SINC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAR TECHNOLOCY GROUP PINNACLE MICRO INC. QMS INC QUANTUM CORP (H) RADIUS INC SEACATE TECHNOLOCY STREAMLOGIC CORP TEXTRONIX INC. WESTERN DIGITAL CORP. (H) XEROX CORP.  AMERICAN MGMT SYSTEMS (H) ANALYSTS INT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC CAMBRIDGE TECH PARTNERS CERIDIAN CORP. COMPUTER TASK GROUP COMPUTER TASK GROUP COMPUTER TASK GROUP COMPUTEN ON CONTROL OF TARRE ELECTRONIC OATA SYSTEMS CORP INTELLIGENT ELECTRONICS KLANE INC. (H) MICROAGEINC PAYCHEX POLICY MANAGEMENT SYS REYNOLDS AND REYNOLDS SCB COMPUTER TECH INC SELLORS SCHOLDS AND REYNOLDS SCB COMPUTER TECH INC SELLORS SCHOLDS AND REYNOLDS SCB COMPUTER TECH INC SELLORS SCHARE O MEDICAL SYSTEMS SOFTMARE ORP	7,50 30,50 17,50 30,50 24,25 16,63 1,20 23,50 23,50 20,00 33,75 25,00 11,75 25,00 11,00 50,25 58,38 29,00 33,88 29,00 33,88 29,00 33,88 29,00 33,88 29,00 50,25 58,38 41,13 45,88 21,50 61,30 45,88 21,50 61,30 45,88 21,50 61,30 45,88 21,50 61,00 7,56 61,0	-0 13 0 88 1.00 -1.00 2.38 0.50 0.06 1.75 0.38 0.50 0.06 0.00 2.50 0.00 2.50 0.00 2.50 0.00 2.50 0.00 2.50 0.00 2.50 0.00 1 25 0.00 0.44 2 13 4 75 2.00  FF 0.8 -2 13 -0 63 -1 75 -1.88 -0 38 -0 13 1 1 75 -0 13 1 31 1 75 -0 13 0 44 4 94 -0.06 0 13 0 50 0 0 63 -0 25 1 88 -0 38 -0 13 -0 38 -	3.0 6.3 4.0 16.7 16.7 16.8 3.2 0.0 3.1 3.2 0.0 30.4 4.4 23.1 3.2 0.0 30.4 4.4 8.9 2.2 4.1 3.9 4.1 3.9 4.1 3.9 4.1 4.1 3.9 4.1 3.9 4.1 4.1 4.1 4.1 4.1 4.1 4.1 4.1
	DTM EMC EMLX ESCC EXBT IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STLC TEK WOC XRX  SET  ANLY AUD BOMI CATP CEN COO CHRZ CSC TSK CPU COAT CHRZ CSC INACL KEA MICA PAYX PAYS PAYS PAYS PAYS PAYS PAYS PAYS SCBI SEIC SSPE	8 63 33 13 32 13 24 000 82 75 74 38 63 38 38 50 55 50 52 8 25 50 52 63 38 75 50 50 50 50 50 50 50 50 50 50 50 50 50	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88 3.75 10.88 3.75 10.88 22.00 0.75 29.75 29.75 39.88 17.50 34.88 25.44 13.88 36.63 19.88 36.63 19.88 36.63 19.88 36.63 19.88 37.55 10.13 10.	EMC CORP. (H) EMULEX CORP. EMULEX CORP. EVANS AND SUPHERLAND EXABYTE INTELLIGENT ÍNFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAK TECHNOLOCY GROUP PINNACLE MICRO INC. QMS INC QUANTUM CORP (H) RADIUS INC SEAGATE TECHNOLOCY STREAMLOGIC CORP TEXTRONIX INC. WESTERN OIGITAL CORP. (H) XEROX CORP.  AMERICAN MGMT SYSTEMS (H) ANALYSTS INT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC CAMBRIDGE TECH PARTNERS CERIDIAN CORP. COMPUTER TASK GROUP COMPUTER TASK GROUP COMPUTER TASK GROUP COMPUTER TASK GROUP COMPUTER TOOK CORP. INACOM CORP INACOM CORP INTELLIGENT ELECTRONICS KLANEINC (H) MICROACEINC PAYCHEX POLICY MANAGEMENT SYS RETNOLDS AND REYNOLDS SCH CORP. SHARED MEDICAL SYSTEMS SOFTWARE SPECTRUM INC. SCH CORP.	7,50 30,50 17,50 30,50 24,25 16,63 1,37 23,50 23,50 20,00 63,40,25 48,25	-0 13 0 88 1.00 .1.00 .2.38 0.50 .0.69 0.00 .2.50 .0.00 .0.19 1.25 0.00 .44 2.13 4.213 4.213 4.213 4.213 6.225 1.38 6.38 6.31 75 .1.88 6.38 6.31 1.31 1.75 0.13 1.31 1.75 0.13 1.31 1.75 0.13 0.50 6.3 0.25 1.38 6.38 6.38 6.38 6.38 6.38 6.38 6.38 6	3.0 6.3 4.0 16.7 16.7 16.8 3.2 0.0 9.4 1.2 3.2 0.0 3.2 0.0 3.4 4.4 8.9 2.2 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 3.9 4.1 4.1 4.1 4.1 4.1 4.1 4.1 4.1
	DTM EMC EMLX ESCC EXBT IOM IPLS KMAG MTSI PEAK PNCL AQMM ROUS SEG STIC TEK WOC XRX  SET' AMSY ANLY AUD BOMI CATP CEN COO CHRZ CSC TSK CPU COOAT EGGS EOS INAC INAC INEL KEA PAYX PMS SEIC SSPE VST SNOT	8 63 33 33 33 33 33 33 33 33 33 33 33 33	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88 3.75 10.88 0.44 18.13 22.00 0.75 29.75 39.88 15.75 39.88 15.00 64.13 16.75 6.50 12.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT ÍNFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAR TECHNOLOGY GROUP PINNACLE MICRO INC. QMS INC QUANTUM CORP (H) RADIUS INC SEAGATE TECHNOLOGY STREAMLOGIC CORP TEXTRONIX INC. WESTERN DIGITAL CORP. (H) XEROX CORP.  AMERICAN MGMT SYSTEMS (H) ANALYSTS INT'L (H) ANALYSTS INT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC CAMBRIDGE TECH PARTNERS CERICIAN CORP. COMPUTER TASK GROUP COMPUTER TASK GROUP COMPUTER TOOM OF THE TOOM OF TOOM OF THE TOOM OF THE TOOM OF THE TOOM OF TO	7,50 30,50 20,00 24,25 16,63 1,70 23,50 20,00 33,75 25,00 11,75 25,00 11,75 25,00 50,25 58,38 29,00 50,25 58,38 41,13 45,88 41,13 41	-0 13 0 88 1.00 -1.00 2.38 0.50 0.06 0.38 0.50 0.06 0.00 2.50 0.00 2.50 0.00 0.19 1 25 0.00 0.44 2 13 4 75 2.00  FF O.8 -2 13 -0 63 -2 18 88 6 31 0 13 1 75 -0 13 1 75 -0 13 1 75 -0 13 -0 44 4 94 -0.06 0 63 0 25 1 88 6 31 0 50 0 063 -2 44	3.0 6.3 4.0 16.7 16.7 16.8 3.2 5.9 1.5 4.4 1.2 4.0 3.2 0.0 30.4 4.4 8.9 4.1 3.2 0.3 3.4 4.4 8.9 4.1 3.2 0.3 3.2 1.5 4.1 4.1 3.2 0.3 3.2 1.5 4.1 4.1 4.1 4.1 3.2 0.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1
	DTM EMC EMLX ESCC EXBT IOM IPLS KMAG MTSI PEAK PNCL AQMM ROUS SEG STIC TEK WOC XRX  SET' AMSY ANLY AUD BOMI CATP CEN COO CHRZ CSC TSK CPU COOAT EGGS EOS INAC INAC INEL KEA PAYX PMS SEIC SSPE VST SNOT	8 63 33 33 33 33 33 33 33 33 33 33 33 33	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 17.63 11.25 10.13 4.88 3.75 10.88 0.44 18.13 22.00 0.75 29.75 39.88 15.75 39.88 15.00 64.13 16.75 6.50 12.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT (INFO. SYSTEMS IOMEGA CORP IPL SYSTEM SINC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAR TECHNOLOCY GROUP PINNACLE MICRO INC. QMS INC QUANTUM CORP (H) RADIUS INC SEACATE TECHNOLOCY STREAMLOGIC CORP TEXTRONIX INC. WESTERN DIGITAL CORP. (H) XEROX CORP.  AMERICAN MGMT SYSTEMS (H) ANALYSTS INT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC CAMBRIDGE TECH PARTNERS CERIDIAN CORP. COMPUTER TASK GROUP COMPUTER TASK GROUP COMPUTER TASK GROUP COMPUTEN ON CONTROL OF TARRE ELECTRONIC OATA SYSTEMS CORP INTELLIGENT ELECTRONICS KLANE INC. (H) MICROAGEINC PAYCHEX POLICY MANAGEMENT SYS REYNOLDS AND REYNOLDS SCB COMPUTER TECH INC SELLORS SCHOLDS AND REYNOLDS SCB COMPUTER TECH INC SELLORS SCHOLDS AND REYNOLDS SCB COMPUTER TECH INC SELLORS SCHARE O MEDICAL SYSTEMS SOFTMARE ORP	7,50 30,50 20,00 24,25 16,63 1,70 23,50 20,00 33,75 25,00 11,75 25,00 11,75 25,00 50,25 58,38 29,00 50,25 58,38 41,13 45,88 41,13 41	-0 13 0 88 1.00 -1.00 2.38 0.50 0.06 0.38 0.50 0.06 0.00 2.50 0.00 2.50 0.00 0.19 1 25 0.00 0.44 2 13 4 75 2.00  FF O.8 -2 13 -0 63 -2 18 88 6 31 0 13 1 75 -0 13 1 75 -0 13 1 75 -0 13 -0 44 4 94 -0.06 0 63 0 25 1 88 6 31 0 50 0 063 -2 44	3.0 6.3 4.0 16.7 16.7 16.8 3.2 5.9 1.5 4.4 1.2 4.0 3.2 0.0 30.4 4.4 8.9 4.1 3.2 0.3 3.4 4.4 8.9 4.1 3.2 0.3 3.2 1.5 4.1 4.1 3.2 0.3 3.2 1.5 4.1 4.1 4.1 4.1 3.2 0.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1
	DTM EMC EMLX ESCC EXBT IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STIC TEK WOC XRX  SET' AMSY ANLY AUD BOMI CATP CEN COO CHRZ CSC TSK CPU COAT COO CHRZ CSC INAC INEL KEA PMS SEG INAC INEL KEA PMS SIMEO SSPE VST SNOT  KEY: (I	8 63 33 33 33 33 33 33 33 33 33 33 33 33	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 11.25 10.13 4.88 3.75 10.88 0.44 18.13 22.00 0.75 29.75 39.88 17.50 13.63 34.88 25.44 13.88 36.63 19.88 36.63 19.88 19.00 64.13 19.00 64.13 19.00 19.	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT ÍNFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAR TECHNOLOGY GROUP PINNACLE MICRO INC. QMS INC QUANTUM CORP (H) RADIUS INC SEAGATE TECHNOLOGY STREAMLOGIC CORP TEXTRONIX INC. WESTERN DIGITAL CORP. (H) XEROX CORP.  AMERICAN MGMT SYSTEMS (H) ANALYSTS INT'L (H) ANALYSTS INT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC CAMBRIDGE TECH PARTNERS CERICIAN CORP. COMPUTER TASK GROUP COMPUTER TASK GROUP COMPUTS AND CONTROL ON TOO TO THE CONTROL ON TO THE CONTROL ON TO THE CONTROL ON TOO TO THE CONTROL ON TO THE CONTROL ON TOO TO THE CONTROL ON THE CONTROL ON TO THE CONTROL ON THE C	7.50 30.50 30.50 30.50 30.50 30.50 30.50 31.75 32.50 33.75 25.00 06.33 40.25 4.88 27.38 41.13 46.88 37.38 41.13 45.63 45.23 46.88 37.38 41.13 46.88 37.38 41.13 46.88 37.38 41.13 46.88 37.38 40	-0 13 0 88 1.00 -1.00 2.38 0 0.50 0.69 0.00 -0.19 1 25 1.50 0.00 -0.44 2 13 -0.63 -1.75 2.00 FF 0.8 8 -0.38 0.13 1.31 1.31 1.75 0.13 1.31 1.75 0.13 0.04 4.94 4.0.06 0.13 1.75 0.13 0.06 0.063 0.25 1.88 6.31 0.38 6.31	3.0 6.3 4.0 16.7 16.7 16.8 3.2 5.9 1.5 4.4 1.2 4.0 3.2 0.0 30.4 4.4 8.9 4.1 3.2 0.3 3.4 4.4 8.9 4.1 3.2 0.3 3.2 1.5 4.1 4.1 3.2 0.3 3.2 1.5 4.1 4.1 4.1 4.1 3.2 0.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1
	DTM EMC EMLX ESCC EXBT IOM IPLS KMAG MTSI PEAK PNCL AQM QNTM ROUS SEG STIC TEK WOC XRX  SET' AMSY ANLY AUD BOMI CATP CEN COO CHRZ CSC TSK CPU COAT COO CHRZ CSC INAC INEL KEA PMS SEG INAC INEL KEA PMS SIMEO SSPE VST SNOT  KEY: (I	8 63 33 33 33 33 33 33 33 33 33 33 33 33	4.13 15.13 6.38 19.00 11.63 1.38 5.75 1.63 11.25 10.13 4.88 3.75 10.88 0.44 18.13 22.00 0.75 29.75 39.88 17.50 13.63 34.88 25.44 13.88 36.63 19.88 36.63 19.88 19.00 64.13 19.00 64.13 19.00 19.	EMC CORP. (H) EMULEX CORP. EVANS AND SUTHERLAND EXABYTE INTELLIGENT ÍNFO. SYSTEMS IOMEGA CORP IPL SYSTEMS INC KOMAG INC MICRO TOUCH SYSTEMS INC. (H) PEAR TECHNOLOGY GROUP PINNACLE MICRO INC. QMS INC QUANTUM CORP (H) RADIUS INC SEAGATE TECHNOLOGY STREAMLOGIC CORP TEXTRONIX INC. WESTERN DIGITAL CORP. (H) XEROX CORP.  AMERICAN MGMT SYSTEMS (H) ANALYSTS INT'L (H) ANALYSTS INT'L (H) AUTO DATA PROCESSING BOM INTERNATIONAL INC CAMBRIDGE TECH PARTNERS CERICIAN CORP. COMPUTER TASK GROUP COMPUTER TASK GROUP COMPUTER TOOM OF THE TOOM OF TOOM OF THE TOOM OF THE TOOM OF THE TOOM OF TO	7.50 30.50 30.50 30.50 30.50 30.50 30.50 31.75 32.50 33.75 25.00 06.33 40.25 4.88 27.38 41.13 46.88 37.38 41.13 45.63 45.23 46.88 37.38 41.13 46.88 37.38 41.13 46.88 37.38 41.13 46.88 37.38 40	-0 13 0 88 1.00 -1.00 2.38 0 0.50 0.69 0.00 -0.19 1 25 1.50 0.00 -0.44 2 13 -0.63 -1.75 2.00 FF 0.8 8 -0.38 0.13 1.31 1.31 1.75 0.13 1.31 1.75 0.13 0.04 4.94 4.0.06 0.13 1.75 0.13 0.06 0.063 0.25 1.88 6.31 0.38 6.31	3.0 6.3 4.0 16.7 16.7 16.8 3.2 5.9 1.5 4.4 1.2 4.0 3.2 0.0 30.4 4.4 8.9 4.1 3.2 0.3 3.4 4.4 8.9 4.1 3.2 0.3 3.2 1.5 4.1 4.1 3.2 0.3 3.2 1.5 4.1 4.1 4.1 4.1 3.2 0.3 1.3 1.3 1.3 1.3 1.3 1.3 1.3 1

This information is based on sources believed to be reliable and while extensive efforts are made to assure its accuracy, no guarantees can be made. Nordby International and Computerworld as sume no l'abin'ty for any inaccuracies. For information on Nordby's customized financial research services, call (303) 938-1877.

On the one hand, you need cable.

On the other hand, it better be

reliable.

Need a hand?

Nathaniel Stathum and the team at Bell Labs are ready to lend a hand.

Lucent Technologies

Bell Labs knowlitions

SYSTIMAX® Structured Cabling Systems are one of the most proven premises network backbones in the world. Our fiber optic, copper, and wireless solutions exceed industry (TIA/EIA) standards. Real world testing, with real applications, helps prevent costly down time. Bell Labs innovations. Global installation and support. Unsurpassed 15-year Warranty. When would you like us to start?

CONSULTING SOFTWARE SHARING SERVICE



## How to contact Computerworld

#### TELEPHONE/FAX

Main phone number .....(508) 879-0700 All editors unless otherwise noted below Main fax number..... (508) 875-8931 24-hour news tip line ...... (508) 820-8555

#### E-MAIL

Our Web address is www.computerworld.com. All staff members can be reached via E-mail on the Internet using the form:

firstname\_lastname@cw.com. All IDG News Service correspondents can be reached using the form:

firstname\_lastname@idg.com.

#### LETTERS TO THE EDITOR

Letters to the editor are welcome and should be

letters@cw.com.

Please include your address and telephone

#### MAIL ADDRESS

PO Box 9171, 500 Old Connecticut Path, Framingham, Mass. 01701

#### SUBSCRIPTION/BACK ISSUES

Phone	(800) 669-1002
E-mail circ	culation@cw.com.
Back Issues	(508) 820-8129

#### REPRINTS

..... (508) 820-8125

#### CONTACTING CW EDITORS

We invite our readers to call or write with comments and ideas. It is best to submit ideas to one of the department editors as well as to the appropriate beat reporter.

> Editor Paul Gillin (508) 620-7724 Executive Editor Maryfran Johnson (508) 820-8179

#### DEPARTMENT EDITORS/NEWS

News Editor Patricia Keefe (508) 820-8183 Sections Editor Kevin Fogarty (508) 820-8246 Assistant News Editor Neal Weinberg (508) 820-8177 Assistant Sections Editor Michael Goldberg (508) 620-7789 Online Editor Johanna Ambrosio (508) 820-8553 Associate Editor, News Mitch Betts (202) 347-6718

#### SENIOR EDITORS/NEWS

Government and security Gary H. Anthes (202) 347-0134 Groupware, E-mail, messaging Barb Cole (619) 728-8858 LANs, operating systems Laura DiDio (508) 820-8182 Network/systems management Patrick Dryden (817) 924-5485 IS management Thomas Hoffman (201) 587-0090 IS careers Julia King (610) 532-7599 Intranet Kim S. Nash (214) 716-9822 Apple, software suites Lisa Picarille (415) 347-0555 Databases Craig Stedman (508) 820-8120 Midrange hardware, Jaikumar Vijayan (508) 820-8220 Unix operating systems Internet Mitch Wagner (415) 548-5513 Internetworking Bob Wallace (508) 820-8214

#### SENIOR WRITERS/NEWS

Mobile computing, Mindy Blodgett (508) 820-8168 social issues App development components Sharon Gaudin (508) 820-8122 PCs, PC software April Jacobs (508) 820-8121 Mainframes, high-end storage Tim Ouellette (508) 820-8215

@Computerworld Stewart Deck (508) 820-8155 Telecommunications Kim Girard (508) 820-8223 New products, Matt Hamblen (508) 820-8567 multimedia, low-end storage

@Computerworld Justin Hibbard (415) 548-5515 @Computerworld Patrick Thibodeau (508) 820-8143 Client/server software, Randy Weston (508) 628-4869 Unix apps

#### OPINIONS/VIEWPOINT

Technical Editor Charles Babcock (415) 548-5512 Viewpoint Editor Mitch Betts (202) 347-6718 Staff Columnist Frank Hayes (503) 252-0100

#### DEPARTMENT EDITORS/FEATURES

Technology reviews/ James Connolly (508) 820-8144 Buyer's Guide

#### SENIOR EDITORS/FEATURES

Managing Allan E. Alter (508) 620-7714 In Depth Steve Ulfelder (508) 620-7745 Management Robert L. Scheier (508) 628-4931 Careers David B. Weldon (508) 820-8166 Buyer's Guide Cathleen Gagne (508) 620-7729 Finance & Investing Rosemary Cafasso (508) 668-0515

#### ASSOCIATE EDITORS/FEATURES

Managing Rick Saia (508) 820-8118

#### IDG NEWS SERVICE CORRESPONDENTS

Paris bureau chief Marc Ferranti (33) 1-4904-8001 Paris correspondent | Jeanette Borzo (33) 1-4004-7917 Munich correspondent Torsten Busse (49) 89-811-6057 UK correspondent Ron Condon (44) 181-460-0944 Tokyo correspondent Rob Guth (81) 33-358-6122 Taipei correspondent Terho Uimonen (88) 62-500-6523

Bob Fink, senior research manager (508) 820-8116 Kevin Burden, senior researcher, Laura Hunt, research analyst; Amy Malloy, assistant researcher, Stefanie McCann, senior graphics coordinator; Man Keefe, online researcher

#### COPY DESK

Ellen Fanning, managing editor (508) 820-8174. Roberta Fusaro, assistant managing editor; Christina Aicardi Maguire, senior copy editor, Michelle Davidson, Kimberly Gilliard, senior production copy editors. Jamie Eckle, Pat Hyde, David Ramel, Jeremy Selwyn, copy editors; Monica Sambataro, online copy editor.

#### GRAPHIC DESIGN

Tom Monahan, design director (508) 820-8218; Janell Genovese, Mitchell J. Hayes, Nancy Kowal, senior graphic designers; Carol Lieb, photo researcher/ editor, David Waugh, Mary Beth Welch, graphic designers; Rich Tennant, John Klossner, cartoonists.

#### **AOMINISTRATIVE SUPPORT**

Linda Gorgone, office manager (ext 8176); Connie Brown (ext. 8178), Lorraine Witzell (ext. 8139); Rita Jones (ext. 8172), editorial assistants, Chris Flanagan, West Coast editorial assistant, (415) 548-5563.

#### COMPUTERWORLO MAGAZINES GROUP

(Includes Premier 100, Campus Edition, Best Places to Work, Leadership Series, Intranet Series, Electronic Commerce Journal and vertical industry journals.) Alan Alper, editor (508) 820-8115; Mary Brandel, executive editor; Anne McCrory, Catherine McCrorey, Joyce Chutchian-Ferranti, managing editors; Kimberlee A Smith, assistant managing editor and online coordinator; Stephanie Faucher, art director.

#### @COMPUTERWORLD

@Computerworld is our World Wide Web site. On it, we publish daily news and feature stories that supplement our print coverage. We also have special audio features, such as interviews with industry notables, and the @Computerworld Minute, which is an audio version of the day's top news.

Business Software Alliance ......

A few times each week, we also have Links listings. These are resources related to online and/ or print stories. We also have polls and forums that you must register for to access. The rest of the site is accessible without registering.

Contact: Johanna Ambrosio, Online Editor, (508) 820-8553 or johanna\_ambrosio@cw.com.

### Companies in this issue

Page number refers to page on which story begins. Company names can also be searched at www.computerworld.com.

3Com Corp63
401k Forum, Inc121
Aberdeen Group, Inc12
Actoras Consulting, Inc98
Advance Micro Devices, Inc6
Advanced Package
Engineering Corp69
Advanced Systems Concepts, Inc 69
All America Insurance Co98
Allianz Insurance Co53
AlliedSignal Aerospace Co71
Amdahl Corp
Amdocs77
AMP, Inc
Ampex Corp51
AMR Corp1
Applied Computer Research85
Applied Cybernetics63
APV PLC97
Agua Gem Consultancy Services, Inc 1
Armstrong World Industries, Inc 98
Ascend Communications, Inc63
Ascent Logic Corp84,85
Asics Tiger Corp
Aspen Systems, Inc49
AST Computer, Inc6
AT&T Corp49,69
AT&T Laboratories
AT&T Ventures
Attachmate Corp54
Attachmate Corp54 Avery Dennison Corp16
Attachmate Corp
Attachmate Corp.       54         Avery Dennison Corp.       16         AVL Scientific Corp.       71         Baan Co.       97
Attachmate Corp.       54         Avery Dennison Corp.       16         AVL Scientific Corp.       71         Baan Co.       97         Banc One Corp.       8
Attachmate Corp.       54         Avery Dennison Corp.       16         AVL Scientific Corp.       71         Baan Co.       97         Banc One Corp.       8         Bankers Trust Co.       12
Attachmate Corp

CACI Products Co14
Carrera Computers, Inc49
Caterpillar, Inc28
Centex Construction Co49
Central Vermont Public Service Corp 53
CERN130
CertCo LLC12
Chevron Corp50
Chevron Information Technology Co 17
Cheyenne Software, Inc3
Chrysler Corp28
Church of Scientology
Cisco Systems, Inc 6,12,63
Comcast Corp12
Command Systems, Inc77
Compaq Computer Corp 6,63,121,127
Complete Business Solutions, Inc 98
Computer & Communications
Industry Association
Computer Associates
International, Inc3
Computer Management
Consultants, Inc85
Computer Sciences Corp89
Comshare, Inc53
Comtex Information Systems, Inc 98
Connectix Corp 8
Corning Revereware, Inc53
Corpus Christi Natural Gas Co28
CrossZ Software50,53
CS First Boston Corp1
CyberCash, Inc 12,32
Data General Corp16,49,63
Dataquest
Datatape, Inc 51
David Strom, Inc71
Dell Computer Corp 63,127
Dell'Oro Group 2
Deutsche Telekom AG 69
Digital Equipment Corp 3,49
Disk/Trend, Inc32
Eicon Technology Corp54
Ernst & Young53.73
Farallon Communications, Inc 20
Federal Express Corp 6
Fidelity Investments 121

riist Data Corp12
First Data Resources85
Ford Motor Co
Fore Systems, Inc32
Forrester Research, Inc
FutureWave93
Gartner Group, Inc 10,24,49,83,85,97
Gemplus Cards International12
General Motors Corp28
General Reality130
Genuity10
Giga Information Group8,28
Great Western Financial Corp
GTE Corp74
GTE Data Services3
Guess, Inc16
Guilford Partners Inc32
H&M Consulting, Inc 49,64,77
Harris Corp6
Hewlett-Packard Co
Hughes Electronics28
Hughes, Hubbard & Reed LLP17
Hurwitz Group, Inc12,53
HydraWeb Technologies, Inc
IBM1,3,6,28,32,49,54
IBM

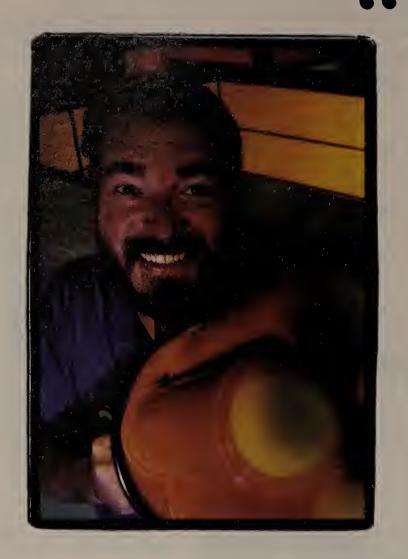
Fiedman, Billings, Ramsey & Co. ......32

Kemper Corp 04
L. L. Bean, Inc.
Lawrence Livermore
National Laboratory71
Legacy Technology, Inc53
Lockheed Martin Corp 4
Logan Lumber Co16
Lotus Development Corp 1,8,63,73
Lucent Technologies, Inc
Make Systems, Inc14
Management Support
Technology Corp 84,98
MasterCard International, Inc74
Mazda Motor of America, Inc63
McAfee Associates, Inc53
McCormack & Dodge12
MCI Communications Corp 20
Merck & Co3
Merit Network Systems, Inc129
Merrill Lynch & Co12
Micro Focus, Inc84
Microsoft Corp1,6,8,12,17,24
28,32,53,56,58,63,91,129
MobilePlanet130
Monsanto Co50
Municipal Electric
Municipal Electric Authority of Georgia53
Authority of Georgia53
Authority of Georgia53 National Board of
Authority of Georgia53 National Board of Medical Examiners63
Authority of Georgia

OneWave, Inc73
Open Market, Inc 8,71
OpenVision Technologies, Inc71
Oracle Corp 1,2,6,8,53,73
Pacific Bell Communications4,10
Packeteer, Inc 6
Passport Corp
Patricia Seybold Group1
Pegasus Venture Partners L.P32
Pennumbra Software3
Pen nzoil Co28
People Unlimited98
PeopleSoft, Inc12,16
Perot Systems Corp63
Picker International63
PictureTalk, Inc6
Platinum Technology, Inc53,64
Polaroid Corp1
Portal Information Network, Inc73
Q.E.D., Inc
R. R. Donnelley &
Sons Publishing Corp14
RadioLAN, Inc 24
RCH Computer Consulting
Read-Rite Corp32
Red Pepper Software Co16
Reno Air, Inc 71
Resonate, Inc6
Resonate, Inc
Reuters12 RHI Consulting85
Reuters12
Reuters12 RHI Consulting85
Reuters       12         RHI Consulting       85         Rockwell Semiconductor Systems       6         Romac International       98         SAPAG       50,97
Reuters       12         RHI Consulting       85         Rockwell Semiconductor Systems       6         Romac International       98         SAP AG       50,97         Seagate Technology, Inc.       32
Reuters       12         RHI Consulting       85         Rockwell Semiconductor Systems       6         Romac International       98         SAPAG       50,97
Reuters       12         RHI Consulting       85         Rockwell Semiconductor Systems       6         Romac International       98         SAP AG       50,97         Seagate Technology, Inc.       32
Reuters       12         RHI Consulting       85         Rockwell Semiconductor Systems       6         Romac International       98         SAP AG       50,97         Seagate Technology, Inc.       32         Security Forces, Inc.       16,49
Reuters       12         RHI Consulting       85         Rockwell Semiconductor Systems       6         Romac International       98         SAP AG       50,97         Seagate Technology, Inc.       32         Security Forces, Inc.       16,49         Sicor LLC       97
Reuters       12         RHI Consulting       85         Rockwell Semiconductor Systems       6         Romac International       98         SAP AG       50,97         Seagate Technology, Inc.       32         Security Forces, Inc.       16,49         Silcor LLC       97         Silicon Graphics, Inc.       1         Smith Technology Corp.       53         Snelling & Snelling, Inc.       16
Reuters       12         RHI Consulting       85         Rockwell Semiconductor Systems       6         Romac International       98         SAP AG       50,97         Seagate Technology, Inc.       32         Security Forces, Inc.       16,49         Sicor LLC       97         Silicon Graphics, Inc.       1         Tomith Technology Corp.       53
Reuters       12         RHI Consulting       85         Rockwell Semiconductor Systems       6         Romac International       98         SAP AG       50,97         Seagate Technology, Inc.       32         Security Forces, Inc.       16,49         Silcor LLC       97         Silicon Graphics, Inc.       1         Smith Technology Corp.       53         Snelling & Snelling, Inc.       16

Software.com. Inc.

SSOE, Inc53
Stingray Software, Inc53
Storage Computer Corp 20
Strategic Research3
Summit Strategies, Inc14
Sun Microsystems, Inc
SunSoft, Inc3
Symantec Corp3
SynOptics Communications, Inc32
Tally Systems Corp
Technologic Partners 20
Telebyte Technology, Inc
TeleChoice, Inc63
Texaco, Inc85
Texas Instruments, Inc28
The Boeing Co74
The Registry, Inc 2,14,53
The Vanguard Group
of Investment Cos 121
The Yankee Group 53,54,63
Thompson Software Products58
Time Wamer, Inc 8
Time, Inc 8
Toshiba Corp 6,63
Trusted Information Systems, Inc 6
Trustmark National Bank63
UniPress Software, Inc71
United States Cellular Corp
US West, Inc
Verifone, Inc14
VeriSign, Inc12
Viacom Interactive Services, Inc 6
Vignette Corp 8
Vinca Corp 63
Visa International, Inc74
VMark Software, Inc
Wall Data Inc 54
Wang Laboratories, Inc
Webmasters Gu id
Webster Network Strategies, Inc
Wir rov 75
WinStar 6
World Intellectual
Property Organization 17
Wondta & Corp
**RQ Inc 53
Zona Res arch Inc



# "because they rock," and other

technical reasons why Netscape

uses Silicon Graphics WebFORCE servers,

according to Webmaster Robert Andrews.

When you're the busiest site on the Web, when

scalability lets your Web site handle even the

you receive more than 112 million hits a day, when you download 2.8 terabytes

most demanding workloads. And since
Silicon Graphics offers the widest range

in a single week, you need servers that you

of compatible servers, you can scale your

can depend on. That's why Robert Andrews,

Web site smoothly as your on-line busi-

Netscape's Webmaster, turned to Silicon Graphics. Our WebFORCE™ servers

www.firefly.com
www.discovery.com
www.travelocity.com
www.bigbook.com
www.warnerbros.com

www.lucent.com www.webcrawler.com

A FEW OTHER SITES USING WEBFORCE

speaking, it's the best server you can buy.

ness grows. Technically

combine 64-bit MIPS®

And it can keep your

RISC microprocessors with

Web site rockin'. For

the highest data throughput in the market.

Our revolutionary S2MP™ system architecture,

www.sgi.com/Products/WebFORCE

more information visit our Web site at

with industry-leading I/O, performance and

or call 800.636.8184 Dept. LS0054.

See what's possible







# Microsoft pushes OEMs

that preload any of the Windows operating systems agree to have their systems boot to a Windows screen before showing anything

What raises the specter of antitrust violations, analysts said, is that computer screens are literally becoming doorways to the Internet and other online

And the assumption is that because most people probably will take the first path offered to them, Microsoft will profit from a built-in advantage.

"All we are asking is that Windows be allowed to run in its entirety — to allow consumers to see the Windows desktop and choose whether they want to use that or whether they want to choose another provided by the OEM," said Mark Murray, a Microsoft spokesman.

The most obvious alternate interface would be Netscape Communication Corp.'s forthcoming Constellation, which will let users toggle between desktop applications and the In-

If the first thing users see on an Internet-enabled desktop is Windows or the Active Directory Microsoft's planned Internet shell — then Microsoft theoretically would have first dibs on steering end users to World Wide Web sites. Microsoft might even be able to command as-yet unspecified fees for Web

John Robb, an analyst at Forrester Research, Inc. in Cambridge, Mass., said Microsoft's attempts to renegotiate OEM licenses in favor of its operating systems may have some farreaching implications.

"There is the potential that Microsoft Office, Windows 95 and even the icons will be turned into a legacy way of interacting with information. If there's ever been an opportunity to displace Microsoft on the desktop, this is it. And they're going to great lengths to ensure that doesn't happen," he said.

Computer makers would like to thwart any efforts by Microsoft to dominate cyberspace to the same extent that it controls the PC desktop. But top hardware vendors won't roll over and

Some, such as IBM and Hewlett-Packard Co., last week said they are talking with Microsoft about their licensing agreement requirements on the interface and boot-up issues. PC makers want to add their custom interfaces to the desktop.

#### **JUST FEUDING**

But six users interviewed by Computerworld said they view the issue largely as an internecine vendor conflict, not something that concerns them except in some very specific instances.

"I don't care about it, and none of my end users notice what boots first as long as they

can access applications and do their jobs," said Dan Schuffert, a senior systems programmer at a large paper manufacturer in the Midwest.

Frank Delargy, a senior information systems manager at Polaroid Corp. in Waltham, Mass., said he isn't concerned, as long as Microsoft makes no attempt to infringe on his rights as an user to customize the interface. "I would rather that the screen be an advertisement for Polaroid than Microsoft," he said.

"Whatever comes up on users' screens is real estate that is essentially owned by the PC vendors. They do have the option of saying no to Microsoft's licensing requests," said an analyst at a Boston-based investment firm, who requested anonymity. He likened the PC screen to property that can be rented in much the same way as a billboard.

"Whoever wants to pay the rental fee should get the benefit of having their advertisement in front of the consumer public. And if Microsoft can entice the PC vendors to rent them that space by leveraging licensing deals, they deserve to reap the bounty," the analyst said.

The Justice Department hadn't responded at press time to calls about whether it will take any antitrust action against Microsoft regarding the boot-Windows-first licensing provi-

#### **OEMs tightlipped about licensing**

Leading PC makers may grouse amongst themselves about Microsoft's efforts to enforce licensing agreements, but they were decidedly more reticent about commenting on the ongoing discussions.

Only Hewlett-Packard in Palo Alto, Calif., would elaborate in any detail on the issue. Jim McDonnell, worldwide marketing director of HP's PC business, said he believes his firm has room to maneuver. "Microsoft's goal would be [to have everything come up Windows], and we would prefer to be able to have some ability to differentiate our product," McDonnell said. He noted that HP's line of consumer PCs includes a page that helps end users with setup information, among other things.

A spokesman for Compaq Computer Corp., the No. 1 PC maker, declined to comment on whether its licensing agreements with Microsoft will or already do include the requirement that systems preloaded with Windows boot up to its main window before anything else.

Dell Computer Corp. in Austin, Texas, said Microsoft doesn't suggest whether Dell should preload any particular operating systems within the Windows family. But a spokesman declined to discuss the boot issue or other specifics of its licensing arrangements with Microsoft.

Microsoft (see story at left), said it has always required OEMs to give users the Windows interface upon booting up machines for the first time but allows for other interfaces to be added or changed after that. — Laura DiDio and April Jacobs

#### **Extent of browser probe disputed**

Netscape and Microsoft disagree on the extent of the ongoing Justice Department probe into Microsoft's alleged unfair browser marketing tactics.

But Gary Reback, a lawyer at Netscape, said the government has widened the scope of its investigation.

Reback said the Civil Investigative Demand office of the Justice Department requested that Netscape send documents "related to many aspects of Internet technology far beyond the browser market." He declined to elaborate.

A Microsoft spokesman denied that the browser probe had been expanded. "We are not aware of any new direction in the ongoing investigation. The Justice Department hasn't requested any documents other than those dealing with browsers," the spokesman said. — Laura DiDio and April Jacobs

# Oracle under the gun

CONTINUED FROM PAGE 1

Corp. in New York this year built a World Wide Web-based financial research library using the object-enabled Illustra database that Informix bought and is blending with its relational engine to create Universal Server.

The investment firm plans to migrate to Universal Server in January.

The DataBlade plug-in technology at the heart of Universal Server eliminated the eight weeks of work that would have been required to tie a database to a text search engine and Web interface builder, said Michelle Kildunne, director of fixedincome trading technology at CS First Boston.

Sabre Decision Technologies, the software development unit of AMR Corp. in Fort Worth, Texas, currently uses Oracle as its decision-support database. But Informix has the inside track for an expanded and object-oriented data warehouse that will be built next year, said Brad Jensen, a Sabre vice president in charge of creating planning systems for AMR's American Airlines unit.

Oracle could get back in the race if Universal Server flunks ongoing tests, Jensen said. "But this is a case of us having a business need that technology is catching up to, not the other way around. Time is of the essence here," he said.

Wayne Eckerson, an analyst at Patricia Seybold Group in Boston, said Informix's shipment of Universal Server should be "a watershed moment" in the database market. "They have Oracle on the run big-time," he said.

A half-dozen other users at DB/Expo who looked at Universal Server also said it gives Informix an edge over Oracle. Universal Server provides a single platform for putting objects and multimedia data such as video, images and audio alongside standard relational files.

Oracle announced its own Universal Server package in February with support for video,

text and spatial data. But its video server is "basically a separate product," said Alfred Watkins, a senior technical staff member at AT&T Laboratories in Holmdel, N.J. "You're left to do the integration yourself."

Informix "is way ahead of the present version of what Oracle has" for supporting complex forms of data, said Raghunath Gopalakrishnan, chairman of Aqua Gem Consultancy Services, Inc., a Princeton, N.J., company that develops applications for financial and telecommunications customers.

But Mark Jarvis, vice president of server marketing at Oracle, said any suggestion that Informix is ahead is "basically a misunderstanding in the market." Jarvis said Oracle's "general take is 'been there, done that.' The only catch-up here is on Informix's part."

One factor that may minimize Informix's time-to-ınarket lead over Oracle8 is its initial support for only Unix systems from Sun Microsystems, Inc. and Silicon Graphics, Inc. Windows NT and other Unix platforms won't follow until the middle of next year.

Alex Berlin, director of software engineering at Multex Systems, Inc. in New York, said Informix's Universal Server looks "cleaner and more advanced" than what Oracle offers. But he said the lack of up-front Windows NT support may force Multex to use Oracle for a financial information database that it markets to investment firms.

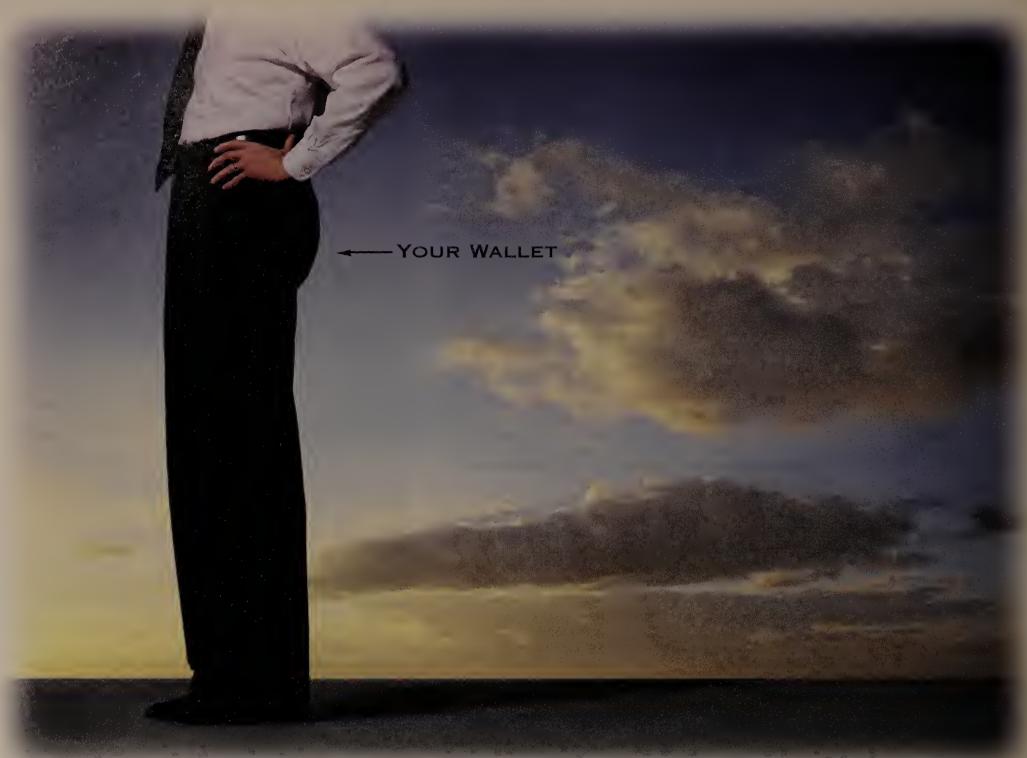
Periodical postage paid at Framingham, Mass., and other mailing offices. Posted under Canadian International Publication agreement #0385697. Computerworld (ISSN 0010-4841) is published weekly: except a single combined issue for the last two weeks in December by Computerworld, Inc., 500 Old Connecticut Path, Box 9171, Framingham, Mass. 01701-9171. Copyright 1996 by Computerworld, Inc. All rights reserved. Computerworld can be purchased on microfilm and microfiche through University Microfilms Inc. 300 N. Zeeb Road Ann Arbor, Mich. 48106. Computerworld is indexed. Back issues, if available, may be purchased from the circulation department. Photocopy rights: permission to photocopy for internal or personal use is granted by Computerworld, Inc. for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of \$3 per copy of the article, plus \$.50 per page is paid directly to Copyright Clearance Center, 27 Congress Street, Salem, MA 01970. Reprints (minimum 500 copies) and permission to reprint may be purchased from Sharon Bryant, Computerworld, Inc., 500 Old Connecticut Path, Box 9171, Framingham Mass. 01701-9171. Requests for missing issues will be honored only if received within 60 days of issue date. Subscription rates: \$3 a copy: U.S. — \$48 a year; Canada — \$110 a year; Central & So. America — \$150 (Surface) a year; all other countries — \$295 a year. Subscriptions call toll free (800) 669-1002. POSTMASTER. Send Form 3579 (Change of Address) to Computerworld, Box 2044. Marion, OH 43305











### THERE'S ONLY ONE PLACE YOU'LL NOTICE A DIFFERENCE BETWEEN OUR MEMORY AND THE SYSTEM MANUFACTURER'S.



It's a little-known fact. Kingston® memory uses the same highquality components and technology as the leading Unixworkstation manufacturer's memory.

Yet it costs up to 50% less. Maybe that's why more and more computing professionals are choosing Kingston, the memory specialists. After all, Kingston is the world's leading manufacturer of

memory. Our engineers specifically design each module for the system it will be used in, guaranteeing 100% compatibility. In fact, Kingston has licensing agreements with Sun Microsystems® and Silicon Graphics,\*\* plus service agreements with Digital\* and IBM\*. And just

> to prove how confident we are in our memory, we give it a lifetime warranty. To get the memory that's just right for your Unixworkstation, call out toll-free number at: (800) 435-0669. You'll find that our memory is the

same as your Unix-workstation manufacturer's in every way, except one: the



For more information call us at (800) 435-0669



# Don't let Microsoft hijack Java

## David Coursey

don't live in the Sun "Java is all things" realitydistortion field, but I think Java could prove very important to business and personal computing. The Internet needs a platform, and Java wants to provide it.

Java also wants to be the guarantor of cross-platform application compatibility. The guarantor of a single target environment for developers of client/server applications. The competitor that keeps Microsoft honest and Netscape et al. alive.

If you think those things are important, it's time to start voting with your voice and your dollars. I'll point you to the ballot box in a moment.

Why the call to action? Barely a year after deciding to support Java, Microsoft appears to be planning to run off with it. The company is working on a native-code compiler for Java that would let developers build faster Java applets — but only if they're optimized for Windows [CW, Dec. 2]. That could fragment Java and ruin cross-platform compatibility — if your idea of cross-platform is broader than Windows and NT.

Does the world need Microsoft to add all manner of proprietary enhancements to Java? I hardly think so. I've said for

some time that Microsoft has failed to learn the lessons of the Internet. "Internet values" are to Microsoft as "family values" are to politicians: nice to talk about but something else entirely to commit to. Microsoft doesn't understand that the Internet explosion took

place because open standards finally won a battle — though certainly not the war.

For all the lip service it pays to openness, Microsoft is really more interested in customer lock-in than in advancing the state of the art. That's sad because

Microsoft would be just as big and just as strong if it played on a level field. The only difference is that the company would have more teams to play against, and we'd all benefit from that.

But I just happen to have a convenient way for you to fight back. If you'd like to make your feelings known, drop by the Microsoft Wish List (www.microsoft.com/support/feedback/mswish.htm) and leave a comment. Please send me

a copy, too. I'll make sure they get to the proper executives in Redmond.

This is your chance to be heard. Tell Microsoft to adhere to the standard Java implementation being created by Sun, Netscape and virtually the entire non-Microsoft world.

Tell Microsoft you want a standard virtual machine, not something the company dreamed up to keep you locked in to its operating systems, development tools and applications. Tell Microsoft that compatibility and openness more

than make up for whatever bells and whistles it can offer as incentives for customer lock-in.

The next six months may decide whether Java grows up as a platform or is relegated to the status of a programming language (which won't threaten Microsoft platforms). By doing nothing, you vote for the latter. Only by raising a stink — by making yourself heard loud and clear — can you prevent Java from being shunted off to the language lab.

When Java was licensed to Microsoft, I was against the move, which I hope both Sun and Netscape now regret. The vendors failed to prevent a hijacking, but maybe it isn't too late for the will of the corporate customer.

When Microsoft offers you a nonstandard Java implementation — with features neither Sun nor Netscape support — insist that you want your Java straight, without additives.

Coursey is editor and publisher of "coursey. com," an electronic newsletter at www. coursey.com. When you send your little Java valentine to Microsoft, you can cc: him at david@coursey.com.



# Flaps on 'net devour data

Charles Babcock

know IS managers who talk seriously about using the Internet as their corporate WAN. They must not know what they're getting into. For E-mail, it makes sense to rely on the Internet — if you can afford to lose messages occasionally. For distributing key corporate applications, it doesn't.

The Internet is a wonderful thing — if you like rapid, organic growth environments such as catfish ponds and the Okeefenokee Swamp. If you depend on the Internet for critical data conveyance, you'd better realize what you're wading into. "Route flapping," for instance.

We all know that use of the 'net has mushroomed. But few people understand how all the new traffic is being handled. Behind the scenes, Internet routing resources are strained to the limit — and often beyond. Routers read addresses contained in headers of data packets that are transmitted over the 'net. They then look up the address in their routing tables to calculate a route along which to forward the packet.

To get a clearer picture of how this traffic system works — and sometimes

doesn't — I talked to Bill Norton, head of the Internet Engineering Group at Merit

Network Systems, Inc., the Ann Arbor, Mich., company that manages MichNet. Norton also is chairman of the North American Network Operators Group, a professional group of Internet service providers.

Nationwide, there are about 2,500 Internet service providers, ac-

cording to Norton. Many providers are just beginning to get acquainted with the problems their routers encounter on the Internet.

Five central route servers keep service providers' routers updated in real time

regarding which other nodes are available. But in the process, each router's routing tables have grown much larger. And the backbone Internet service suppliers, of which there are about a dozen, keep adding to the rules that dictate how to choose a route.

#### **FOLLOW THE RULES**

Some of these backbone providers have a peer relationship with one another; they share routing rules and directly exchange traffic among their regions. They don't want to carry more than their fair share

> of traffic, so they build rules into their routers that encourage handing off a message to a competing carrier at the earliest opportunity.

Some service providers' routers are stretched to the breaking point by the combination of constant updates, large routing

tables and complex rules. Some overburdened routers come online only to go down again right away. When that happens, an update concerning the on-again-off-again routers' appearance is broadcast to other routers. That update must

be followed by the posting of their disappearance. That, Norton explains, is known as route flapping.

"We have seen announcements of availability, followed by immediate withdrawals," Norton says. "A transmission proceeds hop by hop. Every time there's a flap, there has to be a recalculation of routes."

Norton stops short of recommending that corporate IS refrain from using the Internet altogether, but he points out that route flapping occurs daily, that the problem is far from being resolved and that it's common for 30% of packets to be lost in a flap. Sometimes those packets can be recovered by retransmission from the source. Sometimes they're gone for good.

Norton's group of service providers is working on solutions, but he says it's difficult to get competitors to talk frankly about their capacity problems.

The 'net's rapid growth is outstripping the ability of a loose federation of suppliers to keep up. Those who decide to send their data over the 'net run increased risks of it disappearing into a route flap.

Babcock is Computerworld's technical editor. His Internet address is charle \_bubcock @ cw.com



# The Back Page The Back Page Dispatches & images from the tringes of the electronic frontier

#### Cyberchat

t's almost enough to make you look forward to getting junk E-mail. Spam Hater is a free Windows program that can fire off a nastygram to people who send you spam E-mail. We haven't given it a thorough test-run and don't vouch for it. But if you're brave, try it yourself at www.compulink.co.uk/ net-services/spam/. The software includes a selection of return flame mail for people with too little time or vitriol to compose their own. — Mitch Wagner

f you build it, they will chat.
That's the motto of the programmers who developed
CyberBabble, free beta software for Windows 95 or Windows NT. It's available at www.
cyberbabble.rwsystems.net. The Internet chat program has the following features:

- ■Unlimited connections. Chat with 87 of your closest friends at once you decide the limit.
- Rich text formatting and pasting. Enhance your chatter with color and different fonts. Paste a poem or Word document into your conversation.

With the Eagle Notebook Display Stand, you, too, can give computer-based presentations without having to hunch over. It costs \$99.95



#### **GHOST SITES OF THE WEB**

Steve Baldwin has chronicled the growing graveyard of

old, abandoned, obsolete and decaying home pages at



Web (www.pathfinder. com/technology/ ghostsites/). For example, the 'Jerry

Garcia is Dead" site hasn't been updated since August 1995. But Baldwin says he's run out of time for ghostbusting, so Ghost Sites is headed to the graveyard, too.

#### Deep Trivia

What was the first document put on the Web?
The telephone book for CERN, the European Particle Physics Laboratory in Geneva.

What was the first item to have its universal product code scanned?

A pack of Wrigley's gum, at Marsh's Supermarket in Troy, Ohio, in 1974.

Where did the name for Forrester Research come from?
Founder George Colony's middle name.

Sources: Tim Berners-Lee; *ID*Systems, Peterborough, N.H.;
Marketing Computers, New York

Send your alt.cw contributions to mbetts@cw.com. If your item is used, you'll receive a cool T-shirt.



Maybe the reason you can't get the CEO to use a PC is the lack of a leather mouse pad to complement the executive suite. It's available from catalog firm Levenger in Delray Beach, Fla., for \$24.95. A monogram costs extra. It comes in

brown, red or black.

The mouse is passe. The Fifth Glove, designed for virtual reality applications, can em-

"expresso"

tual reality applications, can emulate a mouse or joystick by measuring finger flex and hand positions. It's available from General Reality in San Jose, Calif., and costs \$495. The vendor claims you can even type while wearing the glove.

# Inside Lines

#### Lest we forget

Sybase has mostly stood by and watched as its database rivals cranked up their hype machines this fall. But it finally is getting ready to do some cranking itself. Sources say the company plans next week to announce SQL Server Professional for Windows NT, which packages its database with Web development, query and data replication tools. Unix versions will follow at an unspecified date. Sybase also plans within the next couple of months to do a big strategy rundown aimed at calming users made nervous by its recent travails.

#### Shoot out the lights

Last week's DB/Expo '96 is the last one that will be held in New York, and it definitely had that fin de siecle atmosphere. Oracle didn't bother showing up, even for a group debate with other database vendors. Microsoft sent a few marketing and development types, but it didn't have a booth on the exhibit floor. And attendees had to compete with a neighboring convention of dentists for lunch tables and cabs. DB/Expo is merging with Unix Expo and an Internet conference into a new IT Forum show that will debut next September.

#### No room at the road warrior inn

Organizers of last week's Hand-Held and PDA Expo and Forum in San Mateo, Calif., may want to consider a change of venue. Attendees who stayed at the San Mateo Omni Dunfey suffered from guest rooms set in the Stone Age: hard-wired phones with no data ports for modem capabilities. A show spokeswoman acknowledged the irony and said the group is working on finding a more up-to-date site next year. "So close to Christmas, all the hotels were booked," she said.

#### The 10% rule

A computer engineer at MCI Communications was asked how to figure how much storage capacity a network should require. "Well, you need 10% more storage than you've got — always," said Jim Parkhurst, senior staffengineer at MCI in San Jose, Calif.

#### Bill Gates gets animated

Dreamworks SKG co-founder Steven Spielberg may be pals with Microsoft honcho Bill Gates, but that didn't stop Spielberg's Amblin Entertainment from spoofing the billionaire. Amblin's Animaniacs cartoon last week featured a bespectacled nerdy character named Bill who demonstrated his interpersonal skills by videoconferencing with three co-workers in the same room as him. The cartoon Bill also made declarations about owning everything in the world.

#### What's up. OpenDoc?

Look for IBM to release OpenDoc for Windows at Database and Client/Server World in Chicago this week. This will be the architecture's first foray onto Windows and is generally thought to be an integral step in helping the technology gain attention and market share.

#### Microsoft in Denali

On Wednesday, Microsoft will launch the final version of Denali, its scripting development environment for the Internet Information Server, sources familiar with the announcement said. Bob Muglia, vice president of the Internet platform and tools division, will outline the details in a keynote Thursday at Internet World '96 in New York.

ere's one story we won't be bringing you: We got an advisory for an upcoming announcement that came in the form of a puzzle. It was a little plastic doodad, and apparently you had to fold and bend it to the right shape. Presumably, when the puzzle was solved, you'd reveal the name of the sponsoring company, what they're announcing and when. But we're not that good at puzzles, so we gave up and played Yahtzee instead. If you have news for Computerworld, contact news editor Patricia Keefe at (800) 343-6474 or patricia\_keefe@cw.com. And please give us enough information to puzzleitout.

# DATA WAREHOUSING RISAL

In the rush to implement functional data warehousing, many companies have instead created one dysfunctional patchworked database. Which ultimately leads to nothing but pain.

Cayenne has a somewhat more sane solution. A set of tools that allow you to extract your existing data structures by reverse engineering them into logical business models, and then forward engineering them into a physical warehouse design.

This is not some medieval CASE model. It's an adaptable, fluid architecture that lets you stay on top of the meta data, so you can evolve and update across the enterprise as data query and analysis requirements change.

Don't let your data warehouse become another horror story.

Call us at 1-800-285-7294 or visit our web site, www.cayennesoft.com, for a white paper on data warehousing architecture.

#### KEEP DATA WAREHOUSING BEAUTIFUL.

Please send me your guide "Data Warehousing: A Fluid Architecture."

1-800-285-7294 Fax: 617-229-9904

www.cayennesoft.com



# "Evolution has helped species of all shapes and sizes advance. Thanks to SAP, we're one of them."

—Steve Rees Systems Manager Taronga Park Zoo Sydney, Australia

Companies, just like animals, need to adapt to face their challenges. Because we're a nonprofit organization relying on our own operating revenue for funding, we had to find a way to get more from our information.

As we searched for an affordable ERP package, we knew that even if we weren't the biggest of our species, the business processes we face could be as wild and untamed as any Fortune 500 company's.

We were surprised to learn that 29% of SAP's customers were medium-sized companies, with annual revenues under \$200 million. And since SAP now runs on an AS/400 platform, we decided to give it a go.

After just six months of implementation, we were able to identify and eliminate

duplicate processes from purchasing procedures, saving over \$60,000 on the purchasing, freight and cold storage of the fish we feed our animals. And that's not just a one-time highlight. From human resources to inventory to visitor services, we're communicating better and working more efficiently. With SAP, we're getting a better return on our information. And the way our company has evolved would make even Darwin proud.

To find out how SAP software is helping more than 6,000 businesses do business better, call 1-800-283-1SAP, or visit us at http://www.sap.com.

